

CTO

THE MAGAZINE FOR INFORMATION EXECUTIVES

MARCH 1993
VOLUME SIX NUMBER EIGHT
SEVEN DOLLARS

SPECIAL ISSUE

Software Development's New Pecking Order



AN INTERNATIONAL DATA GROUP PUBLICATION

Perdue Farms Inc.'s
Bob Cook

DIGITAL DIGITAL DIGITAL OPENS MONSANTO OFFICES. NAS IS KEY FOR FIBERS DIVISION.



*Earl N. Braafeld
Group Vice President
Monsanto Fibers Division
Vice President
Monsanto Company*

D I G I T A L . T H E O P

"Only one thing is better than computing products, employees can easily tap into of the inner circle, part reaching the top. Staying ployees can easily tap into of the team. Our people there. For Monsanto Chemical information from computer are having more fun.

Company's Fibers Division, systems in plants country-wide and at our St. Louis headquarters. Not only are

facturing carpeting and apparel fibers, the secret to maintaining our leadership position was to give our employees better ways to communicate with each other and greater access to manufacturing information. And it's no secret

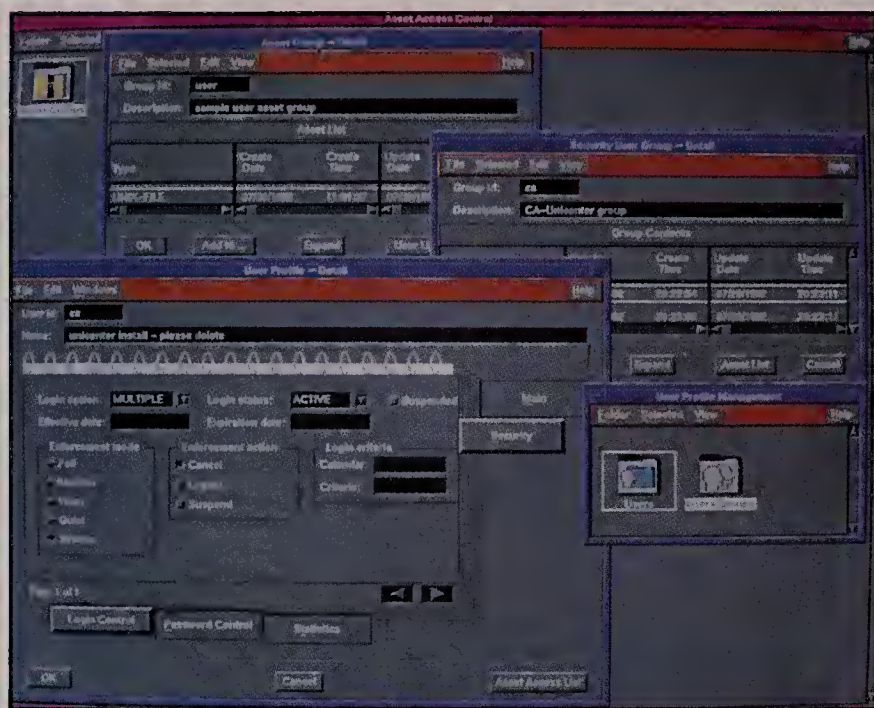


that information sharing is they better able to monitor how Digital can open your Digital's strong suit. each phase of the manufacturing process, insuring consistency in high-quality products, they make better decisions. Everyone's part

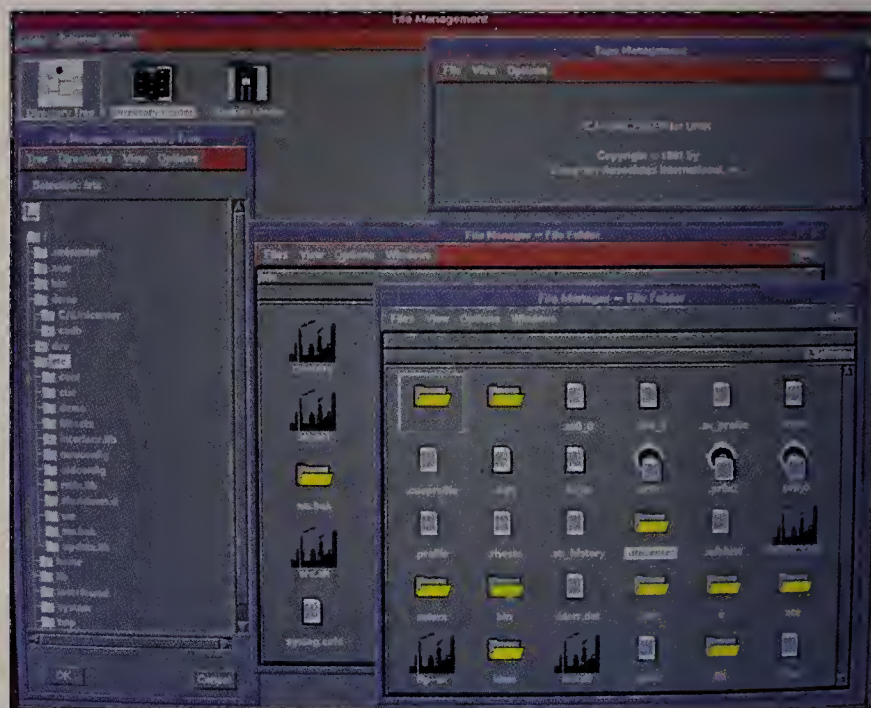
“With Digital's ALL-IN-1™ integrated office system and Network Application Support (NAS) open doing business, call 1-800-DEC-INFO, ext. 92. Or contact your local Digital sales office. **digital**™

E N A D V A N T A G E .

INTRODUCING NEW CA-UNICENTER: MAKING THE WORLD SAFE FOR UNIX.



Security Control gives you single-point control for the entire system. It provides the first and only method for limiting authority of superusers.



Storage Management ensures files are backed up and archived. Frees space when file systems become full and keeps backup and archived files safe from accidental or intentional destruction.



Help Desk includes Machine Generated Problem Tracking and Priority Escalation—so people are immediately notified of critical problems.



Resource Accounting lets you customize billing any way you want—so the right bill has the right information and goes to the right group.



UNIX. But what it really is, is complete peace of mind. Never again will you worry about security. Control. Or administration.

CA-UNICENTER for UNIX gives you all the systems management technology you've been waiting for. Everything you need to control your entire UNIX system and turn it into a safe, productive environment for mission-critical computing.



CA's Computing
Architecture
For The 90s.

Never fear. New CA-UNICENTER® is here.

The first complete systems management software for



Created by the experts in systems management, CA-UNICENTER combines everything CA has learned over the past two decades as the world's leading systems software company.

It's the most powerful, flexible and easy-to-use systems software ever developed. And it's available today.

So why take a chance?

Call 1-800 CALL CAI today for a free Demo Disk and complete information on how we're making the world safe for UNIX.

And how our new CA-UNICENTER can make UNIX safe for you.

COMPUTER ASSOCIATES
Software superior by design.



Voted "A Best Product of the Year" by UNIXWORLD Magazine.



CIO

VOLUME 6, NUMBER 8

SPECIAL REPORT ON SOFTWARE

Section Begins on Page 27

The Burdened Boss

28

For years, managers could organize and motivate people by the book: hire folks with the right skills, make sure they do the job, promote some of them, fire some of them. It wasn't rocket science. But it's rocket science now.

By Thomas Kiely



Ruling the roost 60
Cover photo by Katherine Lambert

The Willing Technician

36

Today's programmers understand the shifting sands of competition and are willing to support strategic change. All they ask in return is a little management support in the areas of motivation, education, user integration and evaluation.

By Richard Pastore

The Reluctant Ally

50

As uncomfortable and confusing as it may be to work in new ways with technical people outside of one's department—and on software of all things—the fact is, users must have a hand in making sure that the system they require really meets their needs.

By Meghan O'Leary

Perdue's New Pecking Orders

60

Springing back from a failed decentralization attempt, this poultry powerhouse discovered that sometimes it takes a tender management style to make a tough IS department.

By Megan Santosus

M O R E ► ► ►

*Tough at
the top 28*





Tools of the trade 70

SPECIAL REPORT (Continued)

The Well-Armed Enterprise

Organizations with a strong survival instinct will see the wisdom of creating a diversified portfolio of development tools and techniques. But assembling the right ones can be a painstaking analytical enterprise.

By Mickey Williamson

70

COLUMNS

INSIGHTS: DARE TO THINK BIG!

Companies that still believe big systems are bad news should take another look. Advances in technology and development approaches have reduced the risks, and the potential benefits are even greater.

By David Starr

22

INSIGHTS: A FAIR SHAKE

Businesses have to look out for their own interests when negotiating software-license agreements.

By Leslie Srager

78

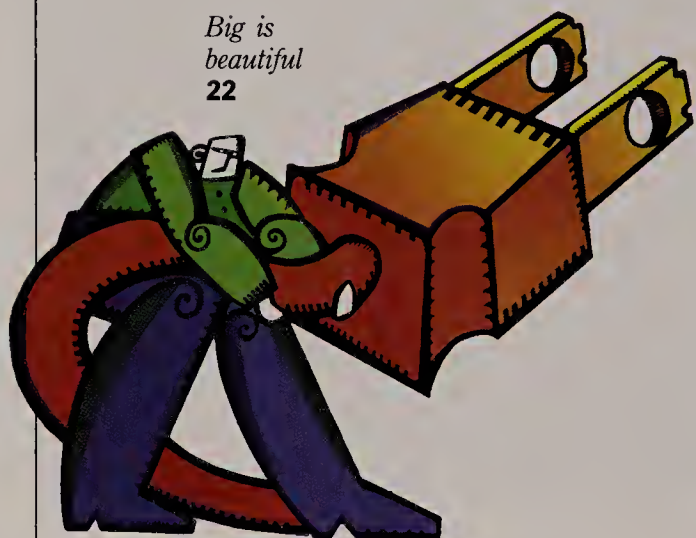
STATE OF THE ART: BUG BUSTERS

Automated software-testing tools can dramatically decrease the error rate of manual methods, but the price of admission can be high.

By Lucie Juneau

82

Big is beautiful 22



DEPARTMENTS

Editor's Letter 8

Publisher's Letter 10

Trendlines 14

- ▶ Physician updates
- ▶ Art-theft registry
- ▶ Data detective
- ▶ Calendar of events
- ▶ IS salaries
- ▶ Postal kiosks

- ▶ ROIT conference
- ▶ Resume disks
- ▶ Trend predictions
- ▶ War-story request

FYI 88

Index 91

Off the Shelf 92



Grad tools 14



IN TAKING OUR SOFTWARE TO THE NEXT STEP, WE FOUND OURSELVES GOING CONSIDERABLY FURTHER.

THE WORLDWIDE SOFTWARE SOLUTION FOR THE AS/400.

AS THE PREMIER PROVIDER OF AS/400 BUSINESS SOFTWARE TO
MULTI-SITE, MULTI-NATIONAL COMPANIES ALL OVER NORTH
AMERICA, WE LEARNED THE CHALLENGES THESE FIRMS FACE
IN OPERATING ACROSS NATIONAL BOUNDARIES. IN
BUILDING THEIR SOLUTIONS, WE CREATED THE SYSTEMS
AND STRATEGIES TO HELP YOU GO BEYOND YOUR
GEOGRAPHIC AND BUSINESS BORDERS AS WELL. WE OFFER
INTERNATIONALLY-ENABLED FINANCIAL, HUMAN RESOURCES,
PROCESS MANUFACTURING, ENVIRONMENTAL AND



MATERIALS MANAGEMENT SOLUTIONS, FEATURING FULL
NATIONAL LANGUAGE SUPPORT, MULTI-CURRENCY AND
VAT PROCESSING, AND POWERFUL CLIENT/SERVER
TECHNOLOGIES. AND, WE'VE FORMED THE SOFTWARE 2000
GLOBAL SUPPORT SYSTEM, CREATING A SEAMLESS
SERVICES NETWORK WORLDWIDE. SO WHETHER
YOU DO BUSINESS AROUND THE CORNER OR AROUND THE
WORLD, CALL SOFTWARE 2000 AT (508) 778-2000. BECAUSE
TOGETHER, THERE IS NO LIMIT TO HOW FAR WE CAN GO.



Software 2000
BusinessWithoutBoundaries



that for its...
of...
CURVILINEAR
[L. curvus = curved]
ed lines : irregular
cery <-Cory
in-ear-ly
econd] : a volume
fr. OE cūscore)
Algonquian origin. It is
quian language of
[Harvey Cushing] : a
lar weakness
d also Cushing's
fr. MF colassin, fr.
COXA] 1 : a
or kneeling 2 : a
embling a cushion
ingy rubber along the
head of a drill brace
oft resilient rubber
tire 3 : an artificial
of falling water and
reducing shock 1 : a
of wear 4 : something
ces or disorders: as
in the economy b : a
atient's discomfort—
adj
-ing \-(ə-)nɪŋ\ 1 :
ess by ignoring 3 :
b : to

cus·tom·er·ize \kūs'-tə-mə-rīze'\ vt 1: to make a company more responsive to its customers and better able to attract new ones 2: to customize an organization's information strategy, e.g., to extend systems capabilities to field locations and other points of customer contact and support 3: what Unisys Corporation does for a growing roster of companies, and government agencies, worldwide **syn** see CUSTOMER SERVICE, COMPETITIVE EDGE, BUSINESS-CRITICAL SOLUTIONS, REVENUE GENERATION

made to individual speci-
to build according to
to venture
the failure of
will

Unisys just added new meaning to the language of business.

Customerize.

Nobody can accurately predict corporate America's future. But there is one thing we all know: For any organization to achieve its potential, customer service must be a business goal.

That's why Unisys has developed a powerful initiative—CUSTOMERIZE.SM This new approach enables businesses to offer customers the advanced customer service crucial in an increasingly competitive environment. Our experienced services professionals work with you to

design an information strategy that extends your full capabilities all the way to the points of customer contact—where revenue is generated.

And with a CUSTOMERIZED information flow, you'll be more responsive to customers and better able to meet their needs. You'll also be more strategically positioned to nurture customer loyalty, generate new

business and achieve major gains within your own organization in productivity and control. All of which facilitates reduced costs and increased revenues.

With decades of experience dedicated to helping our customers serve their customers, Unisys is uniquely qualified to CUSTOMERIZE your business.

Call us at 1-800-874-8647, ext. 10, for your complimentary CUSTOMERIZE Information Kit. And ask how we can help put you on the same page as your customer.

UNISYS
We make it happen.



Our issue this month is dedicated to managing the software-development process at a time when organizational upheaval is more the rule than the exception. As many IS executives put it, the pressure to manage people skillfully has never been greater, and the task must be accomplished in tandem with the difficult culture changes underway in the enterprise. Three of our articles explore the software-development challenge from the perspectives of the programmer, the user and the IS executive.

A recent survey by management consulting firm Deloitte & Touche revealed that 31 percent of IS staff members were dismissed in 1992—more than two times the rate of 1991. Many of these dismissals were because of failure to master the skills necessary to adapt to the new software-development environment. In writing "The Willing Technician," beginning on Page 36, Senior Writer Richard Pastore found that programmers want the flexibility and time to develop the skill-sets to master the new distributed-computing environment. They also want IS executives to provide motivation and support for building quality relationships with user departments.

Bringing the user into the equation calls to mind a refrain from the musical *Oklahoma* about why the farmer and the cowboy can't be friends. Put in software-development terms, this translates to, why can't the IS professional and the user work together? Well, the situation seems to be improving. Users are becoming increasingly willing to assume a primary responsibility for the systems that are developed on their behalf. Senior Writer Meghan O'Leary explores the pleasures and pitfalls of IS-user teamwork in "The Reluctant Ally," beginning on Page 50.

CIOs are hard-pressed to promote collaboration between IS and user customers. In "The Burdened Boss," on Page 28, Senior Writer Thomas Kiely finds that IS executives have to be the motivators in building supercharged teams and promoting the IS mission within the organization.

Rounding out the tableau is a profile of Perdue Farms Inc., beginning on Page 60, by Writer Megan Santosus that describes how this poultry producer transformed its IS organization to meet the needs of today's business environment.

The relationships among the diverse entities within enterprises create the dynamic for corporate creativity. The CIO has to help the cowboy and the farmer become friends. Get ready for a hoedown.

Marcia Blumenthal

P.S. Last month you saw the announcement of our ESPRIT Awards competition. Complete rules and an application form appear on the following page. Please enter.



© By CIO Publishing Inc.

Publisher/Editorial Director JOSEPH L. LEVY

Editor-in-Chief MARCIA BLUMENTHAL

Managing Editor LEW MCCREARY

Art and Design Director MARY LESTER MARSHALL

Special Projects Editor ALLAN E. ALTER

Associate Editor ABBIE LUNDBERG

Associate Editor LEIGH BUCHANAN

Senior Writer THOMAS KIELY

Senior Writer MEGHAN O'LEARY

Senior Writer RICHARD PASTORE

Writer/Researcher MEGAN SANTOSUS

Assistant Art Director MOIRA GILLIS

Design Associate KIM MORNEAU

Editorial Assistant MINA C. AHN

Director of Marketing CATHY O'LEARY HAYES

Production Director LORI BETH SADEWITZ

Director of Finance & Admin. WALTER MANNINEN

Assistant to the Publisher DIANE MARTIN

Circulation Director CAROL A. SPACH

Fulfillment Manager SUSAN WOODWORTH

Senior Promotions Specialist MARCY L. DILL

Production Associate MICHAEL C. PETERSON

Sales & Marketing Specialist BRIDGET CAMMARATA

Sales & Marketing Assistant DOT CASPERSEN

Circulation Assistant BEVERLY BIGHAM

Administrative Assistant LYNN J. PALMQUIST

VP/GM, Exec. Programs LYNDY ROSENTHAL

Director, Exec. Programs DEBORAH HALON

Registrar ELIZABETH L. LADENDECKER

Administrator, Exec. Programs CHRISTINE MCCARRON

Contributing Writers Lucie Juneau, Dave Starr, Mickey Williamson

Contributing Copy Editor Carol Zarrow

Editorial Offices CIO Publishing Inc., 492 Old Connecticut Path, P.O. Box 9208, Framingham, Mass. 01701-9208
(508) 872-8200, FAX (508) 879-7784

Subscriber Services (800) 788-4605



Board Chairman PATRICK J. MCGOVERN

President WALTER BOYD

Executive Vice President WILLIAM P. MURPHY



The
ESPRITSM
Awards
FOR
1993

Honoring Excellence in Strategic Partnering for
Return from Information Technology

Sponsored by *CIO* Magazine and
Booz·Allen & Hamilton

“Wow. We n technology could contribution to

The value of IT. It's real. You know it and you've proven it. Your organization is actually realizing business value and hard-dollar benefits from information technology investments. And although the payback is its own reward, a little recognition will bring your company and IT organization the industry recognition you all deserve!

Honor and Recognition

It takes a disciplined organization to strategically plan the acquisition of information technology, implement it and reap the rewards. It takes more than guts and business savvy to en-

sure that technology solutions succeed. It takes partnership.

CIO and Booz·Allen & Hamilton

have created the ESPRITSM Award to honor those organizations using IT to its fullest potential — companies that strive to use IT to provide real business value.

Positioning IT as a Business Asset

Many companies still regard information technology as an overhead expense, not as a valued asset. It's time we turn these misconceptions around and inform organizations that IT actually can lower costs, increase profits or enhance your market image.

ESPRITSM Awards Timeline

Applications Due:
May 15, 1993

**Judges Select
Winners:**
September 1993

**Announcement of
Winners:**
January 1994

Awards Ceremony:
Spring 1994

ever thought make that kind of the bottom line.”



In essence, the ESPRITSM Award goes beyond recognition. It is an opportunity to provide hard, tangible facts about return on investment from information technology to the business community at large. It is an opportunity to demonstrate how partnering between business and technology executives can increase the effectiveness of both and accelerate the achievement of strategic objectives. By communicating the payback, *CIO* and Booz·Allen & Hamilton hope to encourage other businesses to invest in IT to ensure their survival in a fiercely competitive global market. The award recognizes those who have successfully provided value with IT, while providing *CIO* readers with the ammunition to both justify spending on information technology and measure IT's ROI.

Our Challenge to You

If your technology investment is paying off in this way, we want to hear about it

We urge you to participate by filling out the ESPRITSM Awards application form. The January 1994 issue of *CIO* will feature the companies, government agencies and not-for-profit organizations that have proven that partnered IT investments can have a positive and sustained impact on the bottom line. Then in early 1994, *CIO* and Booz·Allen & Hamilton will host a special awards ceremony honoring these winning organizations.

For more information, contact Mina Ahn at (508) 935-4449.

The 1993 ESPRITSM Awards

For Excellence in Strategic Partnering for
Return from Information Technology

Sponsored by *CIO Magazine* and
Booz·Allen & Hamilton

STATEMENT OF PURPOSE
Executives are aware of the potential benefits of information technology (IT) but remain unsure of its actual value to their organizations. In order to demonstrate how IT can produce hard-dollar benefits when aligned with business needs, *CIO Magazine* and Booz·Allen &

Hamilton are co-sponsoring the ESPRITSM Awards. The honorees will be public and private companies, government agencies and not-for-profit organizations which have proven that IT investments can have a positive and sustained impact on the bottom line. Winners will be honored at an awards ceremony and profiled in the January 1994 issue of *CIO Magazine*.

CIO will also use the information collected from entrants to provide readers with insights into how to calculate the return on investment from information technology.

We invite information-systems (IS) and business-unit executives to jointly apply for the award, provided that:

- ▶ they can demonstrate, in actual dollars, the return on investment achieved from the application of IT, and
- ▶ they are willing to be featured, along with their system and organization, in a *CIO* article.

CRITERIA

Winners will be chosen by a panel of independent judges from entrants who have sent in completed nomination forms by May 15, 1993. Entries will be judged on the following criteria:

- The measurable financial return to the organization.
- The extent to which that return is aligned with the organization's strategic objectives.
- The extent to which IT was key to the achievement of the return—the “couldn't have done it without technology” factor.

The sponsors and judges will determine the number of awards and the award categories.

Telephone interviews, and in some cases face-to-face interviews, will be requested by the Booz·Allen screening teams. These teams may elect to visit the finalists' sites in order to review in greater depth the entry, the system and the environment in which it is functioning.

DEADLINE

May 15, 1993

MAIL TO

ESPRITSM Awards
CIO Magazine
492 Old Connecticut Path
PO Box 9208
Framingham, MA
01701-9208

ENTRY GUIDELINES

- The system must have been operational prior to July 1, 1991.
- Entries must be made jointly by the IS executive AND at least one of the business-unit executives for whom the system delivers value.
- Entries must be complete. Incomplete entries may be returned for elaboration or disqualified.
- Entries must be on 8.5x11-inch paper, one side per sheet.
- The entry form may be reproduced.
- Multiple entries from one company will be considered,

but each entry must be submitted separately.

- Vendors, public-relations and advertising firms, consultants and other third parties may NOT apply on behalf of another firm. They may forward this form to the "owner" of the system, or contact *CIO Magazine* to recommend that an entry form be sent.
- All entries must be computer-generated or typed; no handwritten entries will be accepted.
- Where feasible, an additional copy of the entry should be sent on a floppy disk. Electronic entries must be limited to word-processing and spreadsheet packages that are compatible with *Microsoft Word* and *Microsoft Excel* on either a PC or Macintosh platform.

1. COMPANY/BUSINESS UNIT

NAME OF PARENT COMPANY:

CITY, STATE WHERE HEADQUARTERED:

IF A COMPANY, IS IT ☐ PUBLICLY HELD? ☐ PRIVATELY HELD?

ANNUAL REVENUES:

INDUSTRY:

NAME OF BUSINESS UNIT OR ORGANIZATION:

CITY, STATE WHERE LOCATED:

NUMBER OF EMPLOYEES:

2. ENTRANTS

NAME OF ENTERING BUSINESS-UNIT EXECUTIVE:

TITLE:

NAME OF DIVISION, DEPARTMENT OR UNIT:

ADDRESS:

CITY:

STATE:

ZIP:

TELEPHONE:

()

FAX:

()

NAME OF ENTERING IS EXECUTIVE:

TITLE:

NAME OF IS ORGANIZATION:

ADDRESS:

CITY:

STATE:

ZIP:

TELEPHONE:

()

FAX:

()

3. SUPPORTERS

Please list four people who are willing to be interviewed with regard to the system, its development, its use and the value returned. At least one should be a member of the technology team that developed the system and should have played a significant role. At least one should be a primary user from the sponsoring business unit. The other two may be from either organization or represent suppliers, customers or others intimately familiar with the system.

A. NAME:

TITLE:

TELEPHONE:

()

REASON FOR INCLUSION:

B. NAME:

TITLE:

TELEPHONE:

()

REASON FOR INCLUSION:

C. NAME:

TITLE:

TELEPHONE:

()

REASON FOR INCLUSION:

D. NAME:

TITLE:

TELEPHONE:

()

REASON FOR INCLUSION:

4. THE NOMINATED ORGANIZATION

Please tell us about your organization (company, business unit, agency) in 500 words or less. Include information on:

- when the organization was founded;
- mission statement;

- major products and services;
- markets served, and
- any other data you believe relevant in terms of general background.

5. THE NOMINATED SYSTEM

Tell us about the nominated system and demonstrate its ROI by completing the following sections. Please limit your material to five pages.

- **Objectives:** Identify the primary business objectives of the IT investment.
- **Scope and Impact:** Identify the functions (e.g., customer service, manufacturing, planning) that were changed by the system, the nature of those changes and their impact on the business. Identify other business-change initiatives tied to the IT investment.
- **Alignment with Strategic Objectives:** Describe how the technology investment is aligned with the organization's strategic objectives, including any new business initiatives. Note any significant event that would help us evaluate the nominated system's value. Examples might include a merger, a new distribution channel or a significant regulatory change.
- **The Importance of IT:** Identify the different components of the overall business change (e.g., business reengineering, downsizing, cycle times). Explain the importance of the IT component to the overall business change.

6. TECHNICAL PROFILE

Briefly describe the technology of the nominated system. Please include the names of major vendors and products. If you prefer, you may attach a document containing a technical description of the system, providing it is no more than five pages.

NOTE: The examples provided here are meant to be illustrative, not all-inclusive.

- **Architecture** (e.g., mainframe, distributed, client/server)
- **Hardware** (e.g., mainframe/parallel processor, minicomputer/server, desktop computers, handheld/portable devices)
- **Software** (e.g., operating systems, database system, shells, application software)
- **Software development tools** (e.g., CASE, 4GLs, GUI developers, object-oriented development tools)
- **Networking/Communications hardware, software and**

services (e.g., modems, routers, electronic-mail packages, carriers and public networks)

7. TRUTH OF INFORMATION/RELEASE

The following release must be signed by both nominating executives if the nomination is to be considered. Unsigned releases will invalidate the entry.

I hereby state that the information provided is true and complete to the best of my knowledge and belief.

I authorize the release and use of, in connection with the ESPRITSM Awards program, any and all materials furnished by me or others at the company contacted for this judging. I understand that information submitted on this entry form or subsequently gathered during the evaluation and judging process may be used in articles or any other type of publicity relating to the ESPRITSM Awards program.

I also authorize the release and use of my name, my company's name and my likeness, including but not limited to any photographs and any recording of my voice or image that may be taken of me for CIO Magazine. I agree that no compensation shall be due me or my company for such usage.

I recognize that failure to meet these conditions or to provide sufficient material that can be published can cause the nomination to be rejected at any point in the process at the sole discretion of the sponsors.

SIGNATURE OF NOMINATING BUSINESS EXECUTIVE:

DATE:

SIGNATURE OF NOMINATING IS EXECUTIVE:

DATE:

8. OTHER EDITORIAL OPPORTUNITIES

If you are not selected as an award recipient, are you willing to be contacted for inclusion in other articles in CIO Magazine? Yes ☐ No ☐

How did you learn about the ESPRITSM Awards program?

- | | |
|--|---|
| ☐ CIO Magazine | ☐ Vendor |
| ☐ Booz·Allen & Hamilton | ☐ Academician |
| ☐ IS staff member | ☐ Consultant |
| ☐ Other publications | ☐ Systems integrator |
| ☐ Other (please identify) | |

C H E C K L I S T

Have you filled out...?

- ☐ Company/Business-Unit, Entrants and Supporters Information
- ☐ Return on Investment Chart

Have both entrants signed and dated...?

- ☐ Truth of Information/Release

Have you included on separate pages...?

- ☐ Nominated Organization
- ☐ Nominated System
- ☐ Technical Profile
- ☐ Additional Return on Investment Material

Have you checked off...?

- ☐ Other Editorial Opportunities
- ☐ How you learned about the ESPRITSM Awards program?

9. QUANTIFYING RETURN ON INVESTMENT

Directions

- The table below provides a framework for breaking down costs and benefits. Feel free to break down any line item into additional components, or to add new line items if necessary. Please explain how the figures were arrived at, on separate sheets if necessary.
- In quantifying costs and benefits, every effort should be made to quantify strategic and "intangible" benefits (e.g., competitive positioning, risk management). It would be helpful to attach any documents you have prepared that explain the system's costs and benefits.
- You may also include your own return on investment calculations and frameworks to further explain your return on investment. These can be attached to your nomination form.

Guidelines for Quantifying Return on Investment

- Provide return and investment figures five years out from initial implementation. Where the system has been in operation for less than five years, you may project future investments and returns *based on historical data*.
- All investments and expenditures made before implementation should be included in year "zero."
- Distinguish actual costs and benefits from projected costs and benefits.
- To the extent the nominated system replaced older technology, the system investment reflected in the tables should be net of corresponding salvage values and ongoing costs.
- Return and investment figures should be stated on an approximated after-tax basis.

NOTE: The examples provided below are meant to be illustrative, not all-inclusive. All numbers are subject to verification.

	Year 1 19 ____	Year 2 19 ____	Year 3 19 ____	Year 4 19 ____	Year 5 19 ____	TOTAL
Return:						
Incremental profits from enhanced revenue (e.g., new revenue streams, productivity improvements)						
Reduced operating costs (e.g., labor, material)						
Reduced capital investments (e.g., capital equipment)						
Reduced inventory						
Indirect cost avoidance (e.g., avoided hiring, fines, fees)						
Total Annual Return	\$	\$	\$	\$	\$	\$

Total Return: \$

	Year "0" 19 ____-19 ____	Year 1 19 ____	Year 2 19 ____	Year 3 19 ____	Year 4 19 ____	Year 5 19 ____	TOTAL
Investment:							
Technology purchases (e.g., hardware, software, lease payments, amortization)							
System development and implementation (e.g., systems integration and consulting fees, initial training)							
Ongoing system maintenance and enhancement (e.g., updating system, maintaining and replacing software, adding users)							
Ongoing system operations (e.g., ongoing training and consulting, help desks, other ongoing support)							
Non-systems operational charges (e.g., increased labor or inventory, early retirement program for laid-off employees)							
Total Annual Investment	\$	\$	\$	\$	\$	\$	\$

Total Investment: \$

Total Return on Investment: \$
(Total Return minus Total Investment)

The 1993 ESPRITSM Awards
*Honoring Excellence in
Strategic Partnering for Return from
Information Technology*

Sponsored by CIO Magazine and
Booz·Allen & Hamilton



THE MAGAZINE FOR INFORMATION EXECUTIVES

BOOZ·ALLEN & HAMILTON

NEW TO MARKET

ONE OF THE MOST SOPHISTICATED DATA PROCESSING CENTERS ANYWHERE

Approximately 100,000 sq. ft. in Hopewell Township, New Jersey
(Princeton area)



STATE-OF-THE-ART INFRASTRUCTURE:

- 3 separate raised floor areas on 2 levels. Upper has 2 units; one of 24,000 s.f. and one 10,000 s.f. Lower has one of 16,000 s.f.
- Operational flexibility for hot and cold sites
- 4 Exide 450 kva, UPS modules
- 4 Atlantic Detroit diesel 1040 kw generators
- 7 pillar 415 hz. motor generators
- 4 Liebert main frame power units
- 4 Carrier 200 ton chillers
- 2000 s.f. tape library, equipped with rolling racks
- Advanced fire alarm system featuring activating water or Halon fire suppression capability
- Redundant electrical feeder lines

For further information,
contact exclusive leasing agent

**CUSHMAN &
WAKEFIELD®**
A ROCKEFELLER GROUP COMPANY

Robert Bundy, Senior Director
Peter Hennessy
1166 Avenue of the Americas
New York, New York 10036
212-841-7524
FAX 212-841-7867

Building Features:

This extraordinary facility would cost more than \$20 million to replicate. Consequently, the ready user has a unique opportunity to benefit from the existing infrastructure in this newly available state-of-the-art facility.

Located in a pleasant campus-like setting, it is a self-contained hardened facility, completely revitalized within the last several years.

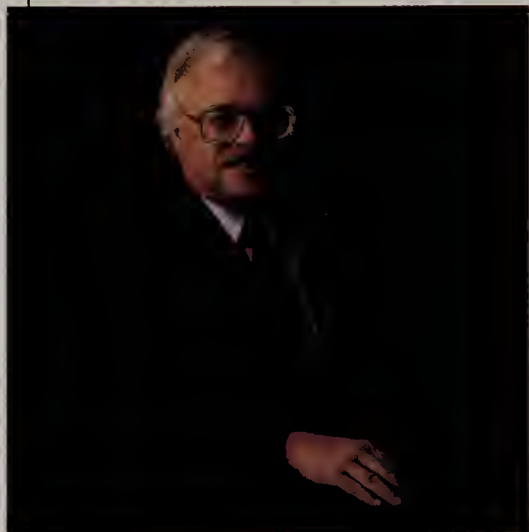
The security of the facility is another of its advantages. In addition to a patrolled campus complex, security is heightened by video cameras, motion detection systems and a card key entrance.

Occupancy can be immediate, and tenancy is aided by furniture and fixtures in place throughout the building, including a satellite dish on the roof.

A prospective tenant is assured of strong financial ownership from one of the nation's most recognized corporations, which currently occupies and maintains the remainder of the office campus.

Location:

Hopewell Township is immediately adjacent to Princeton, NJ, in one of the most desirable areas on the East Coast. It is about midway (1 hour) between New York City and Philadelphia, assuring the occupant of drawing from a very large, diverse and well-trained labor force.



"Everybody wants to fit [client/server] development into a standard main-frame metaphor; they just don't understand the complexity of the new tools we're using."

—Nancy Caraher
Technical Developer
E.I. du Pont de Nemours & Co.

The opinion expressed by developer Nancy Caraher is shared by many of the software architects we interviewed for this issue's article "The Willing Technician," which begins on

Page 36. While many IS executives have been early and avid supporters of client/server technologies, the good news is that these tools are now becoming more widely accepted among once-reluctant Cobol developers.

But as Caraher and her peers point out, many IS executives have not yet made the conceptual shift to the new development paradigm. Consequently, the performance of software developers is often measured by outdated rules. Additionally, these people are sometimes subjected to unrealistic development schedules, without sufficient time to really learn and exploit client/server tools.

It's clear from our research for this issue that IS executives must carefully balance the need for bottom-line results—new client/server systems—with the learning curve of their development staffs. If this doesn't happen, developers will become completely frustrated, and their enthusiasm for using new technologies will begin to wane.

Companies that market client/server technologies can help close the gap by educating IS managers and their staffs about realistic training schedules and requirements for their products. They can also offer hands-on training programs and formal networking meetings where their customers can exchange information on real-life experiences.

Walter L. Lutz

Coming In CIO

Flow Smarts

When the Putnam Companies decided to automate its document workflow, it recognized that the easy way isn't always the best. Instead of laying image-processing automation over the traditional paper-based flow, Putnam first reengineered the flow itself—untangling and streamlining an outdated process. The reward was a productivity gain of as much as 60 percent.

Surviving the Boom

Small mutual-fund marketer Janus Capital Inc. faced the challenge of maintaining quality customer-service levels in the face of unexpected runaway growth. The IS department, little more than a one-man, part-time position shortly before the boom started, helped Janus pull through—at the same time proving its worth and becoming an integral member of the corporate team.

A Thurow Going Over

Lester Thurow, the high-profile dean of MIT's Sloan School of Management and author of the provocative new book *Head to Head: The Coming Economic Battle Among Japan, Europe, and America*, answers questions about global competition, the domestic economy and the role of information technology in an exclusive CIO interview.

PHOTO BY GEORGE SIMIAN

Cost-Effective Information Management

You've surely heard of the many benefits of imaging technology. But with all the investments in your department's computing environment, it just doesn't make sense to purchase a large, costly imaging platform that locks you into proprietary technologies, or a small, PC-based system that lacks the power to perform the applications you really need.

ERI has the solution.

OutLOOK is an open-architected imaging system that fits easily into your department's current computing environment – MS-Windows-based PCs, Apple Macintosh computers, X-terminals, Sun Microsystems® workstations and servers, you name it! ERI integrates existing hardware and software with new systems and applications resulting in more efficient, cost-effective information management capabilities on the desktop.

Available in a basic configuration, or with a wide choice of enhanced functions and custom-developed applications, OutLOOK incorporates the latest in scanning systems, optical storage devices, flexible RDBMS software, and powerful computing platforms that are completely open to new technologies and changing user needs.

Real World Benefits

What does OutLOOK mean for our clients? For one multinational bank, it meant an escape from antiquated systems that were limiting their ability to manage numerical and textual information.

ERI Custom Software Services designed an OutLOOK System to streamline the gathering, storage, and manipulation of large volumes of data. By integrating Sun Microsystems® SPARCstations™, leading-edge scanners with character recognition software, a relational database and a customized graphical user interface (GUI), the bank acquired a valuable tool which dramatically reduces costs and improves departmental productivity.

Open Systems Imaging: What's In It For You?

800-222-1050



The Architects Of Open Systems Solutions

Sun and the Sun logo, (and all other Sun trademarks mentioned or displayed in the ad) are trademarks or registered trademarks of Sun Microsystems, Inc. All SPARC trademarks, including the SCD Compliant logo, are trademarks of SPARC International, Inc. SPARCstation 2 is licensed exclusively to Sun Microsystems, Inc. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

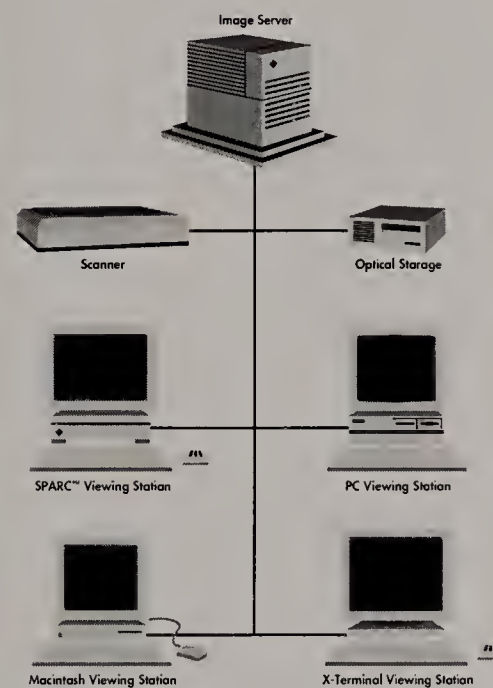
All other names, products and services mentioned are trademarks or registered trademarks of their respective organizations.

Customized Solutions

Because we custom-develop OutLOOK to match specific requirements, users can retrieve and edit visual data on Sun SPARCstations, PCs, X-terminals and countless other devices. ERI University's Corporate Trainers provide customized training, so users gain the knowledge and confidence they need to use the system effectively. And ERI's Customer Support Center provides tailored service programs that give users the assistance they need, when they need it.

Penalty-Free Upgrades

To protect your investment from product obsolescence, ERI offers the most current technologies as well as leasing programs that permit upgrades without financial penalty. So, you can upgrade your system and protect your bottom line at the same time.



Sample OutLOOK Configuration

Improve Your Outlook

If you want to preview the power of OutLOOK, call us today and we'll send you a free OutLOOK VHS tape or CD-ROM presentation. Just ask for Department D-2.





Canadian Airlines International Found A Strong CASE For Managing Change.

In the rapidly changing world of the airline industry, Canadian Airlines International Ltd. understands that keeping seats filled and continually exceeding customer expectations largely depend on how well they manage change. So when they wanted to implement a state-of-the-art frequent flier program in record time, they turned to IEF™ CASE software from Texas Instruments.

The Information Engineering Facility (IEF) offers a diverse portfolio of software, which lets you do everything from rebuild high-maintenance-cost legacy systems to develop new strategic systems.

And do it more efficiently with higher quality.

Widely recognized as the leading tool for achieving integrated CASE solutions, the IEF helped Canadian Airlines International create their *Canadian Plus*® frequent flier system in less than half the time it would have normally taken to build it from scratch.

Today, Canadian Airlines International knows the IEF can help them adapt to change in other areas as well. They realize the IEF has many strengths other than just enabling reduced application development times.

Richard Nelson, Director of Operations, Canadian Technology Services, Canadian Airlines International Ltd., said, "It (the IEF) has brought the airline tremendous benefits in staff and operating cost efficiencies."



In the end, Canadian Airlines International, with the help of the IEF, produced an outstanding frequent flier program. Customers get better service and Canadian Airlines International has increased passenger count.

Canadian Airlines International is just one of many companies in a diverse range of industries that have also found a strong CASE for managing change. We'd like to share a few more CASE histories with you. Call us now for a copy of *The IEF at Work*. Government purchasers please reference GSA#GS00K92AGS5530.

1-800-336-5236.



Richard Nelson
Director of Operations
Canadian Technology Services
Canadian Airlines International Ltd.

 **TEXAS
INSTRUMENTS**

©1992 TI 76573

IEF is a trademark of Texas Instruments Incorporated. *Canadian Plus* is a registered trademark of Canadian Airlines International Ltd.

TRENDLINES

COMBATING ART THEFT

WHAT'S HOT, WHAT'S NOT

A shifty-eyed fellow in shabby clothes just slunk into your Fifth Avenue gallery carrying an 18th-century Indian shrine god wrapped in newspaper. He says he inherited it from his mother and would you be interested? Who you gonna call?

Faced with the prospect of shelling out big bucks for something that may turn out to be hot, art dealers, auction

The Register helps police and insurance agencies recover stolen works and prevents others from selling them.

The New York office of the Register is at the International Foundation for Art Research, a nonprofit organization whose archives of stolen-art reports form the core of the database. Before automation, the Register stored its paper reports in file cabinets.

"We were just not keeping up with the avalanche of stolen-art reporting," said Constance Lowenthal, executive director of the Foundation.

Now the Register uses an IBM multimedia system developed by Q Systems Research

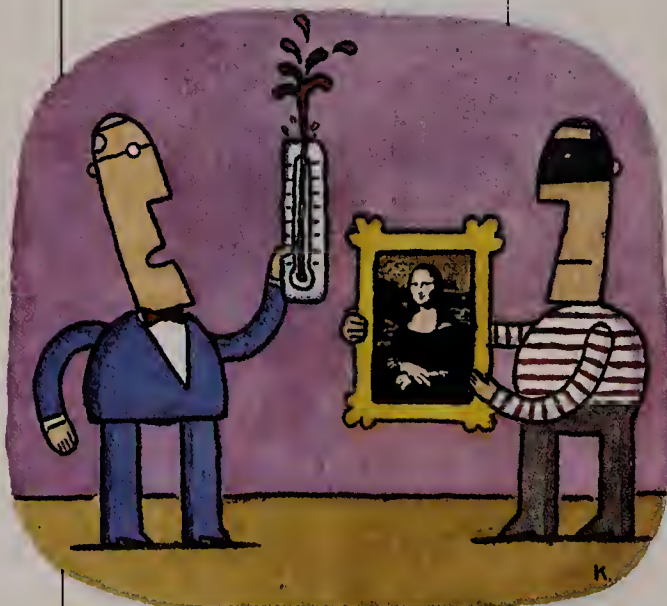
of New York to enter physical descriptions of stolen pieces and scan in their photographs. The application runs on LANs in both the

Foundation's New York and London offices, which maintain identical databases. "The information is accessible through a variety of queries, so you can find things based upon some very broad descriptive parameters," said Tom Dackow, CEO of Q Systems. "The images provide you with a lot more information than the descriptions."

"Sometimes we have an artist's name, but sometimes we only have a description, in which case we do a 'fuzzy search,'" Lowenthal explained. "We will see 'images' on a screen, up to nine at a time, of works in our database that fit the parameters."

The system uses digital video interactive (DVI) technology, which provides high-resolution images and compresses them in order to minimize the space needed for storage.

Since the Register was automated in 1991, it has helped in the recovery of more than 400 art objects. "Recently, officers from Scotland Yard came across an Aladdin's cave full of artworks, and they actually brought a copy of the system down to the warehouse where they were hidden," said Dackow. "They worked with the system for several days and identified close to 200 stolen objects." ■



houses and collectors turn to the International Art and Antiques Loss Register, a computer database of more than 35,000 stolen art objects.

A WINTER ROITREAT

CIO magazine's continuing search for ROIT (return on investment from information technology) stopped off in Phoenix recently for an executive retreat at the Arizona Biltmore resort. Seventy executives, with the help of Eric Clemons of the Wharton School, discussed how businesses select and evaluate strategic investments in IT.

"Many strategic IT investments are made on the basis of gut feel," said Clemons. "How do we check on our guts?" The answer that emerged: If you pay attention to the business opportunities, analyze the risks

and use the right evaluation criteria, IT investments can produce real benefits.

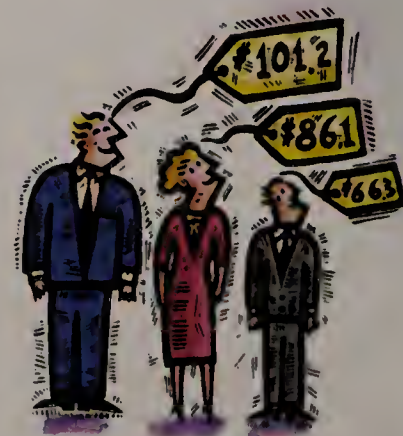
The group heard from IS executives at three companies profiled in CIO's January issue on ROIT and from a panel of CEOs discussing their own technology investment decisions. But mostly, the participants heard from one another. At the core of the retreat were case studies of Rosenbluth Travel, which used IT to increase its bookings from \$40 million to \$5 billion, and National Westminster Bank, an old organization facing new competition. Participants analyzed the case studies in groups and came together to discuss them on the final day of the retreat. ■

ON THE RECORD

Salaries, like sex and religion, are among the things polite people don't talk about at the dinner table. But secrecy has its drawbacks: If you don't know how much the other guy is making, you won't know whether to feel elated or indignant when a prospective employer floats a pay figure or your current boss trots out your annual raise.

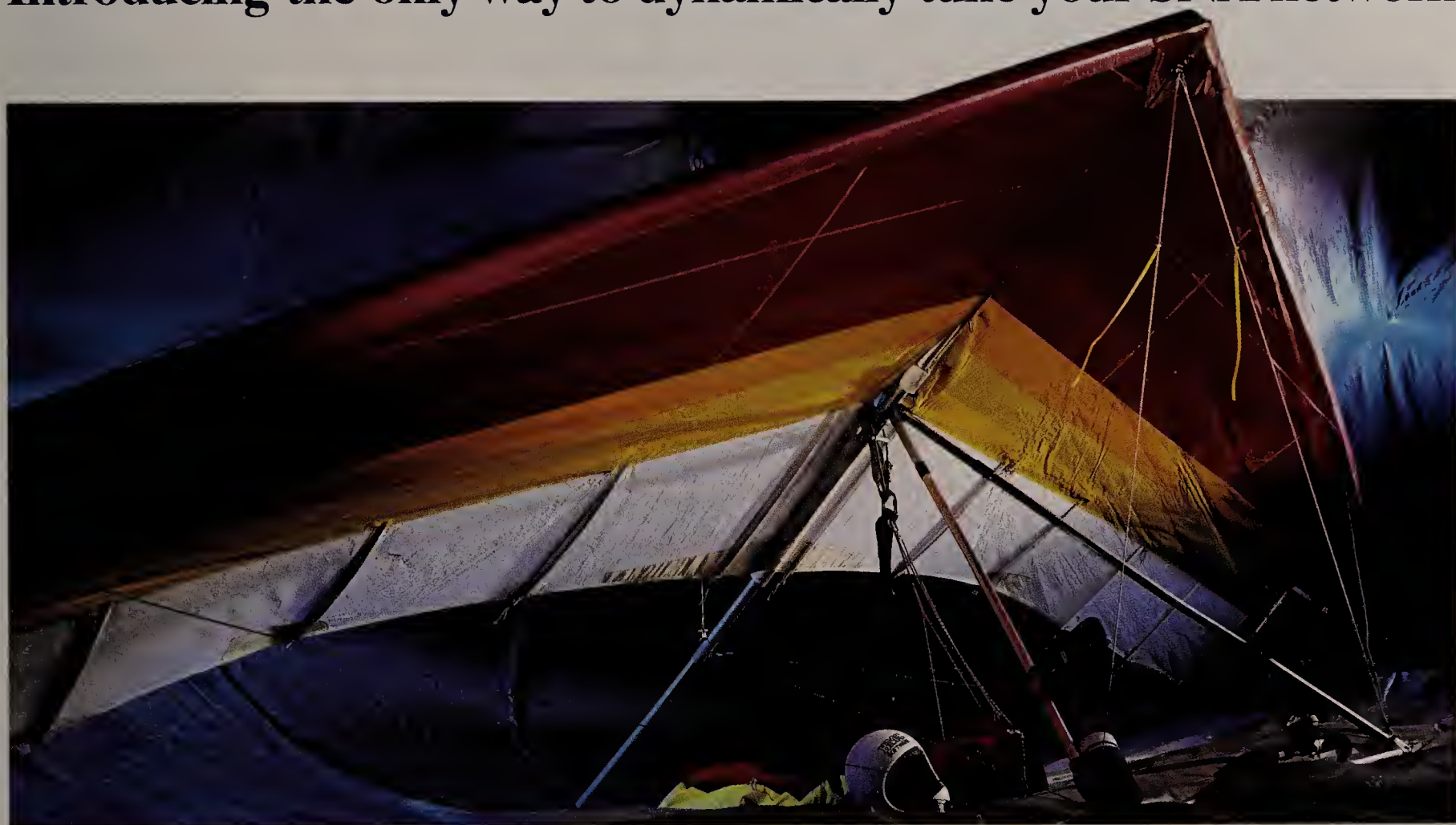
Fortune magazine recently published average annual base salaries for IS professionals, as well as breakdowns by region and industry. Here are the stats, in thousands: chief corporate information officer, \$130.7; top corporate IS executive, \$101.2; division, subsidiary or regional IS executive, \$86.1; application-systems analysis and programming director, \$82.8; director of telecommunications, \$78.3; operating systems programming manager, \$69.3; application-systems analysis and programming manager, \$66.3.

Fortune also reported that CIO salaries are highest in the wholesale/retail industry (compared to utilities and manufacturing). In big cities, New York IS executives were paid the most (with an average of \$172.8) and Chicago executives the least (\$122.8). ■



Tune your NCP on the fly

Introducing the only way to dynamically tune your SNA network



OPERTUNE™ *for NCP*

BMC Software's OPERTUNE for NCP helps you achieve optimum network performance 24 hours a day. Only OPERTUNE allows NCP parameters to be changed manually or automatically without taking down the network.

OPERTUNE allows you to tune for real time, not averages. When the automatic tuning option is selected, OPERTUNE immediately

adapts to any situation, tuning NCP parameters for maximum performance, regardless of workload fluctuation, configuration changes, or line problems. When you choose to tune manually, OPERTUNE identifies problem areas and makes suggestions, offering you quick and efficient solutions.

Maximize your network dollar

Of course, you can upgrade your lines and other communications

resources to improve performance; however, this expensive option is not always necessary or even appropriate. OPERTUNE helps you make the most of your existing network investment by recommending the optimum solution — often enabling you to avoid additional expenditures.

Maximize your network performance with the only product that dynamically tunes your SNA network. For a free trial or more information on OPERTUNE for NCP, call BMC today at 713 240-8800 or **1 800 841-2031**.

BMC

SOFTWARE

The Experience. The Technology. The Future.

BMC Software international offices are located in Australia, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain and the United Kingdom.
©1992, BMC Software, Inc. All rights reserved.



TRENDLINES

ELECTRONIC PRIVACY

ERASE AGAINST TIME

At the last gleaming of the Bush administration's twilight, federal judges sparred with the White House over the fate of electronic records that the administration said it planned to erase. The judges' final ruling enjoined the departing Republicans from trashing E-mail and other electronic files with potential value to historians and investigators.

But to someone like Seattle cybersleuth John Jessen, the prospect of widespread "electronic shredding" is not particularly daunting. Jessen's specialty is unearthing electronic evidence hidden in computer systems—that which has been presumptively destroyed or cleverly concealed. Jessen makes his living prizing this plaque-like evidentiary substance out of those hard-to-get-at places. His gleanings have been pivotal in swinging favorable settlements for the clients of his attorney employers.

For instance, an apparently unwinnable discrimination case, in which all of the paper evidence was impeccably upright, suddenly turned

winnable when Jessen unearthed an E-mail from the company president to the personnel department that read: "Get rid of that tight-assed bitch." Gee, did I say that?

The rapid growth of E-mail has made it inevitable that lawyers will seek to examine computer records as part of the discovery process in court cases. E-mail and other computer records hold the promise of illuminating an organization's decision-making processes, in effect providing an electronic "audit trail" that complements—or perhaps contradicts—the paper trail.

Jessen believes that "official paper documents are becoming less and less valuable in finding the truth." Electronic early drafts "reflect the authors' original thoughts" before the truth "has been crafted out of them."

Jessen's background includes more than a decade spent setting up computer systems for businesses, experience that gave him insight not just into how systems work, but into how people use them. He claims his

greatest strength is knowing where within a system people are likeliest to stash the gems.

While Jessen owes his fame in the Seattle area mostly to evidence-stalking, the bulk of his business is as a consultant to companies eager to learn how best to protect themselves from, well, maybe from people like Jessen.

So before you send that slightly cranky E-mail message, ask yourself this: Are you prepared to see it entered into evidence? ■



STANDS THAT DELIVER

First it was the Elvis stamp contest—now this. As part of its continuing efforts to spiff up customer service, the U.S. Postal Service is introducing high-tech multimedia kiosks that offer stamps, address-change services and even custom printing capabilities.

Putting a warm, fuzzy spin on the technology, the kiosks are known as "Postal Buddies."

The first two Buddies are already operating in Washington and San Diego. By 1995 there should be 20,000 more installed nationwide—making the kiosks the country's most extensive publicly accessed information and printing system, according to their developer and manager, Electronic Data Systems.

Postal Buddies respond to customer inquiries with stereo-quality audio, digital full-motion video, graphics and animation. Each kiosk includes a personal computer with touch-screen and keyboard interfaces, a CD-ROM drive, a laser



printer and a modem linked to a central computer at EDS.

Thinking of relocating? Postal Buddy will fill you in on your destination with city-specific information packages. Bored with your old company stationery and business cards? Postal Buddy can print corporate logos, three-initial monograms and even cartoon characters like Snoopy and Betty Boop to spice up your letterhead.

Who knows, the kiosks may eventually allow customers to customize postage stamps. Then all us portly-Elvis fans will finally have our day. ■

CLARIFICATION

In our January 1993 "Working Smart" column, entitled "Merced County's MAGIC Act," we reported that family assistance representatives received 10 minutes of training. This applied only to the introduction of one new policy change in 1991 and represents a considerable improvement compared to the training required for similar changes in other California counties. Total training time for the MAGIC system was 52 hours per employee.

In addition, the 30 percent reduction in head count refers only to the staff previously required to determine eligibility. Overall head count, including support and administrative staff, has decreased 9 percent since June 1990. Merced's overall case load has increased by 63 percent during the same period. ■

**I'm ready to take one giant leap
for customer service with DCS/Logistics®**

☐ Have someone contact me.

☐ Send me more information on
DCS/Logistics right away.

☐ I plan to evaluate customer service &
logistics software in the future.
Please contact me in

☐ 3 months ☐ 6 months ☐ 1 year +

☐ I am especially interested in solutions for
the following platform(s):

☐ IBM Mainframe

☐ DEC VAX Model _____

☐ Other _____

Name _____ Title _____

Company _____

Address _____

City _____

State _____ Zip _____

Telephone () _____

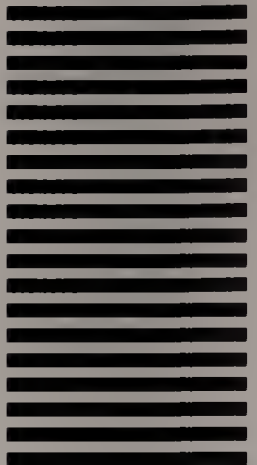


printed on recycled paper

**ANDERSEN
CONSULTING**
Software Products



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 43 CHICAGO, IL

POSTAGE WILL BE PAID BY ADDRESSEE

Andersen Consulting Software Products
Attn: Marketing Operations – A20S
69 West Washington Street
Chicago, IL 60602-9988





Give your customers what they want... ...even if they ask for the moon.

DCS/Logistics® software: the launching pad to a new world of customer service.

What are your customers asking for today? More importantly, what will they expect tomorrow?

Shelf-ready shipping. Order consolidation. Invoicing options. Instant information. Hundreds of customers may pressure you to do business in hundreds of unique ways. With DCS/Logistics distribution management software you can respond faster—and more profitably—to demanding requests. Anywhere in the world.

Capabilities like EDI, bar code scanning, multi-language and multi-currency, order processing, DRP/replenishment, pricing and promotions, inventory and warehouse management, and shipment planning let you build strong, strategic relationships with your customers.

As an open systems solution with a client server architecture and relational database, DCS/Logistics is technically light-years ahead.

Fully scalable versions are available for IBM® and Digital VAX™ platforms.

When your customers ask for the moon, promise it to them. With confidence. Call Andersen Consulting at (800) 541-7512 or (312) 507-6588.

**ANDERSEN
CONSULTING**
Software Products

TRENDLINES

HOSPITAL SYSTEMS

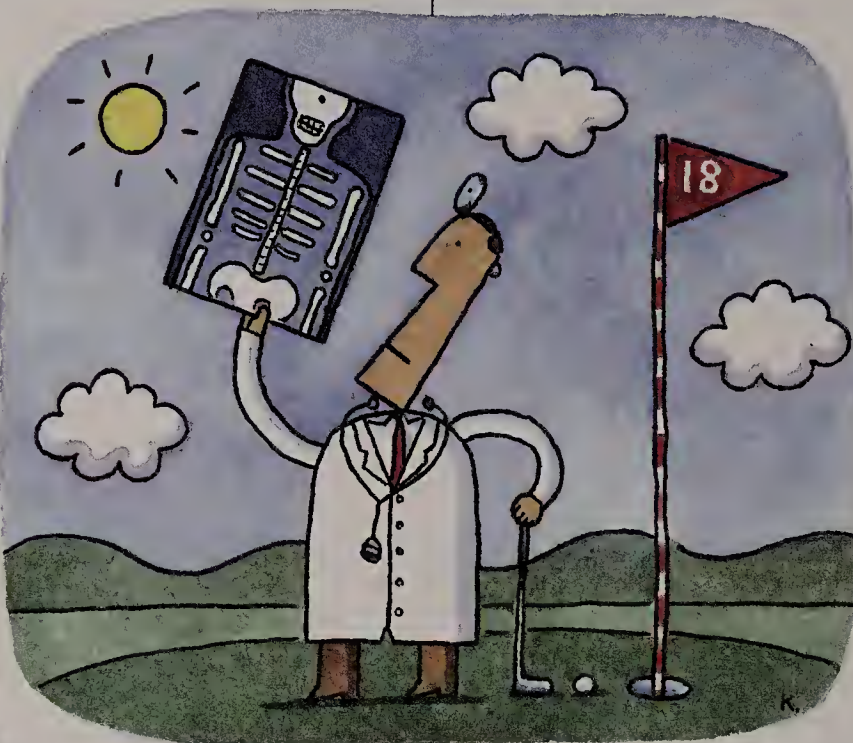
WHEN THE INTERNIST IS OUT

You're laid up in a hospital, and no one can find your doctor; he's out on some golf course or sailing her yacht. So what else is new? Well for one thing, if there's a touch-tone phone handy, your doctor might be better acquainted with your up-to-the-minute condition than you might think.

With digitized voice-dictation and medical-reporting systems now in place at many hospitals, medical professionals can dial in and selectively retrieve dictated voice recordings reporting on a patient's latest condition or test results. Doctors driving into work can get a head start on their rounds by using their car phones to check results of yesterday's biopsies and throat cultures. Similarly, medical staff can dictate reports into the system from any telephone at home or at work, as well as from dedicated dictation stations in

the hospital.

At Cedars Medical Center in Miami, such a system has been operating since 1988. Everything that was once dictated and transcribed—



from admitting exams to discharge reports—now resides for at least one week in the

memory of the system, for instantaneous and selective access by medical staff from remote touch-tone phones and 35 system stations within the hospital.

Besides its obvious convenience for medical professionals, the system has also increased the speed of transcription at the 585-bed facility. For example, cardiac-catheterization reports, which once took an outside com-

mercial service six weeks to transcribe to paper, now get turned around internally in just two days.

In addition, the system's phone-access capability makes it possible for transcription clerks to work from home, a perk that has helped increase productivity from six pages per hour to 10 and reduced the previously high job-turnover rate to nearly zero.

The \$150,000 outlay for the system (it would cost about \$200,000 if purchased today) is only half what was being paid to outside transcription services, according to David Libenson, Cedar's vice president and CIO. The dictation and reporting system, which runs on a Digital Equipment Corp. platform, was developed by Sudbury Systems Inc. of Sudbury, Mass.

TREND SETTERS

The Gartner Group projects the following probable developments as the dominant software trends over the next few years:

- **Client/server, focusing on platform balance and optimization, will become the definition of mainstream technology.**
- **Openness will be defined by "how you build," not "what you buy."**
- **IBM's sphere of influence will implode, breaking its monopolistic control; users will be on their own, and middleware will be king.**
- **Power will shift from hardware vendors to software vendors; software-only architectures and software brand-naming will proliferate.**
- **The near future will see the rise of vendor consortia and, among users, a decade of "base-coat" standard environments. Installed code will become too complex for any one vendor to write, and tensions between *de jure* and *de facto* standard-setters will increase.**
- **Users will declare their independence, as CIOs become CTOs and vendors become partners with users in order to survive.**
- **Cost reduction will continue to push information technology into application "right-costing." Data-center consolidation, automation and "insourcing" will also increase.**
- **Software prices will continue to destabilize as alternative computing styles continue to proliferate.**

NEW INKLINGS

Along with benchmarking and competitive intelligence, trend-watching has become a serious business pursuit. In its second year of publication, *The Trends Journal*, an eight-page quarterly from The Trends Research Institute, focuses on current trends (and trendsetters) to watch in the political, financial, social and business arenas. It attempts to determine the probable impact of trends on imminent business directions and suggests marketing opportunities arising from them.

Some of its coverage—particularly of large, profound trends—seems a bit superficial and obvious. But its identification of trends just starting to happen, based on the analysis of individual phenomena, can help target new opportunities for businesses of all kinds. One recent issue, for example, pointed to the success of the lavish picture book *Dinotopia* as portending a new need for security and well being.

An annual subscription costs \$185. For more information, call 914 876-6700.

These Routers Won't Let Your Network Down

No Single Point of Failure. Ensure that your network stays up, even if a single component fails, with extensive hardware and software redundancy, as well as fault isolation and recovery capabilities.

Unsurpassed Connectivity and Interoperability.

Create one seamless internetwork with support for every major LAN and WAN medium and protocol, including SNA.

On-line Operational Servicing (Hot Swap).

Easily replace any hardware module without taking the router out of service.

SNMP Node Management.

Configure, monitor and control the router from a remote PC or workstation with our windows-based Site Manager. It's as easy as "point and click."



Industry-Leading Performance.

Minimize application response times with forwarding performance that scales to 480,000 pps. Our unique symmetric multi-processor architecture utilizes MC68040-based Fast Routing Engines and our 1 Gbps Parallel Packet Express.

On-line Dynamic Reconfiguration.

Quickly change any configuration parameter without taking the router off-line or rebooting.

Network Security.

Control access to networks, applications, servers and individual users easily and effectively using our Uniform Traffic Filters.

Investment Protection. Satisfy your growing network needs by adding software and hardware modules to our scalable systems, rather than buying new routers. Our commitment to standards ensures interoperability with other products, now and in the future.

Your company's success depends on how well your enterprise internetwork supports mission-critical applications. You need to keep your internetwork running all day, every day, no matter how much traffic it has to handle. Regardless of the number and type of protocols it has to support. Regardless of how often you have to make configuration changes. And regardless of

unexpected malfunctions. That's why your internetwork needs the most technologically advanced routers ever developed – Wellfleet's Backbone Link and Concentrator Nodes. For more information and a free copy of Wellfleet's Router Evaluator, phone us today at **1-617-275-2400, Extension 8.**

After all, you can't afford to choose a router that lets your network, or your company, down.



**When Your Networks Are Complex,
Your Choice Is Simple.™**

TRENDLINES

WAR STORIES WANTED

Like any other corporate trench warfare, the politics of IT can get messy. If you would be interested in sharing some of your hard-won wisdom with attendees at next fall's CIO Conference ("The Politics of IT," Oct. 17-20 in Rancho Mirage, Calif.), our conference program developers would like to hear from you. Tell us how you won your battle ribbons and how the scars of combat led to life-enriching or career-preserving insights. Call Lyn-da Rosenthal at 800 366-0246. ■



SEARCHING: THE CLASS OF '92

Every year, Fortune 500 talent scouts swoop down on college campuses nationwide and pluck the most promising graduates-to-be for their corporations. Meanwhile, smaller organizations are stuck back in the nest, usually relying on tinier, local pools for their new hires.

In an effort to give small businesses greater access to its students, and students a better chance of landing a job, the University of Virginia has begun mailing a free floppy disk containing mini-resumes of its 1992-1993 graduates to companies with between 50 and 500 employees. The disk contains a search feature that allows employers to identify in seconds individuals with desirable skills or experience. For example, a human-resources manager could find all degree candidates with a minimum 3.0 grade point average, a major in economics, word-processing skills and the ability to speak French or Spanish.

"It's a gamble," said Lawrence

A. Simpson, director of the university's office of career planning and placement. "We are redefining the way we operate. If this approach works, our office's role as a middleman will be rewritten."

According to Simpson, the next step for U.Va.'s job-placement program will probably be the use of videophones. "Employers can search the disk and choose five or six prospects they think look promising," he explained. "Then they can call and set aside a block of time to do person-to-person interviews with the candidates." Simpson said his office has already been approached by AT&T about being a test site for such a program. ■



EVENTS

Apple Enterprise Computing Conference

San Francisco Hilton Hotel,
San Francisco
April 5-7
Apple Computer Inc.
800 841-2322

This conference presents practical ways to integrate new technologies while addressing client/server computing, cross-platform development, workgroup computing and other workplace issues. A technology fair, new-product announcements and hands-on technical training are featured. Registration fee: \$795.

Financially Managing IS in a Diverse Environment

Hilton Beach & Tennis
Resort, San Diego
April 21-23
Financial Management for
Data Processing
415 731-3706

Speakers present solutions to the financial problems created by the growth of distributed technology. Issues include technology strategies, service-level agreements, cost control, chargeback, benchmarking, outsourcing and acquisition. Registration fees: \$550-\$650.

VISION '96

Marriott City Center Hotel,
Denver
April 25-28
Xplor International
310 373-3633

This symposium addresses customer needs in document technology through 1996. Attendees can interact with vendors and users and hear specific technology updates and forecasts. More than two dozen technology and tutorial sessions will be featured, as well as 25 technology demonstrations. Registration fee: \$495.

NCGA '93 Computer Graphics Solutions: Applications for Implementations

Philadelphia Civic Center,
Philadelphia
April 26-29
The National Computer
Graphics Association
703 698-9600

This conference is dedicated to computer-graphics applications for engineering and business. It features 150 exhibitors and a program focusing on CAD/CAM/CAE, multimedia, mapping and GIS, graphic arts, industrial design, visual communications and printing and publishing. Registration fee: \$795.

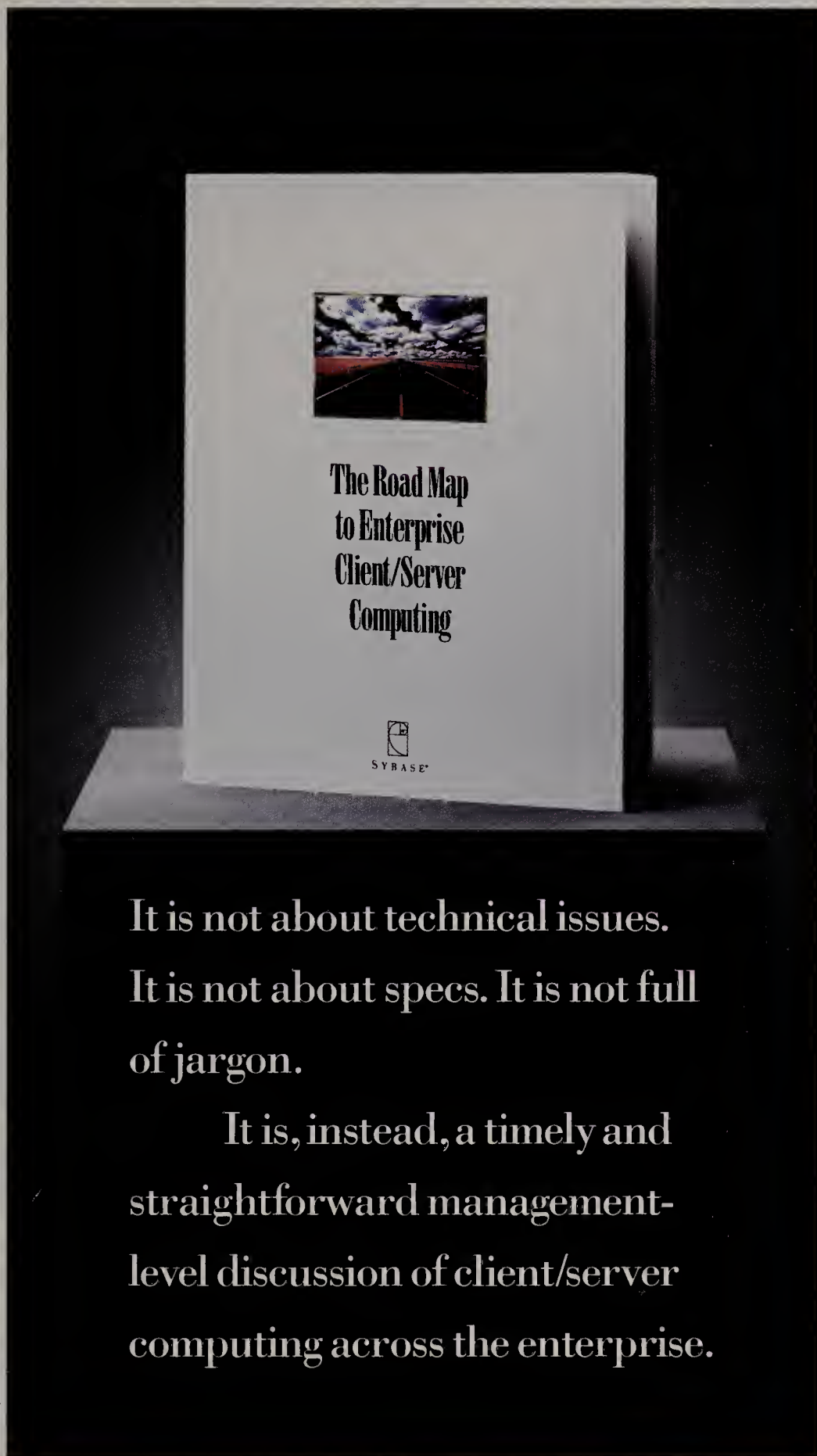
CAREER MOVES

Coopers & Lybrand has appointed ELLEN M. KNAPP, formerly the company's national director of IT consulting, as its first vice chairman of technology. As such she will work to create competitive advantage through the development and application of leading-edge technology.

GERALD KNUTSON is the new vice president of information management for US WEST Marketing Resources in Englewood, Colo. He was previously executive director of information technology systems planning and support for US WEST Communications.

The Technology Capital Network (TCN) of MIT, a nonprofit educational institute dedicated to helping start and sustain new technology enterprises in the U.S., has appointed WILLIAM WOLF as its new executive director. ■

For your personal copy,



It is not about technical issues.
It is not about specs. It is not full
of jargon.

It is, instead, a timely and
straightforward management-
level discussion of client/server
computing across the enterprise.

© 1992 Sybase, Inc.

call 1-800-8-SYBASE.

Dare to Think Big!

Companies that still believe big systems are bad news should take another look. Advances in technology and development approaches have reduced the risks, and the potential benefits are even greater.

BY DAVID H. STARR

When most IS executives were in school, there was a common vision of the systems of the future. They would be large and integrated, and they would contain all of a company's information and make it available to whomever needed it in whatever form they needed it. They would eliminate the drudgery and free up people to do what people do best—think.

Unfortunately, the '70s and '80s witnessed a number of notable failures in the development of very large systems. Most recently, American Airlines wrote off \$109 million for Con- firm, its hotel and car-rental reservation system. As a result, all kinds of limited approaches materialized that avoided the costs and risks inherent in big-system development. The lesson learned: Don't build large, monolithic systems.

But this lesson is no longer applicable. Times have changed, and so has technology—quite dramatically. So, what has happened? Why are things different now? Most importantly, why is it nec-

essary to re-examine this exciting but risky option?

Large, integrated systems still have the value that inspired the original vision. In fact, today's large systems yield greater benefits for less cost than those of the '70s and '80s. Although the price of some technology may have fallen, the main reason for this greater return is that the number of potential benefits associated with large systems has skyrocketed. Today's large systems provide

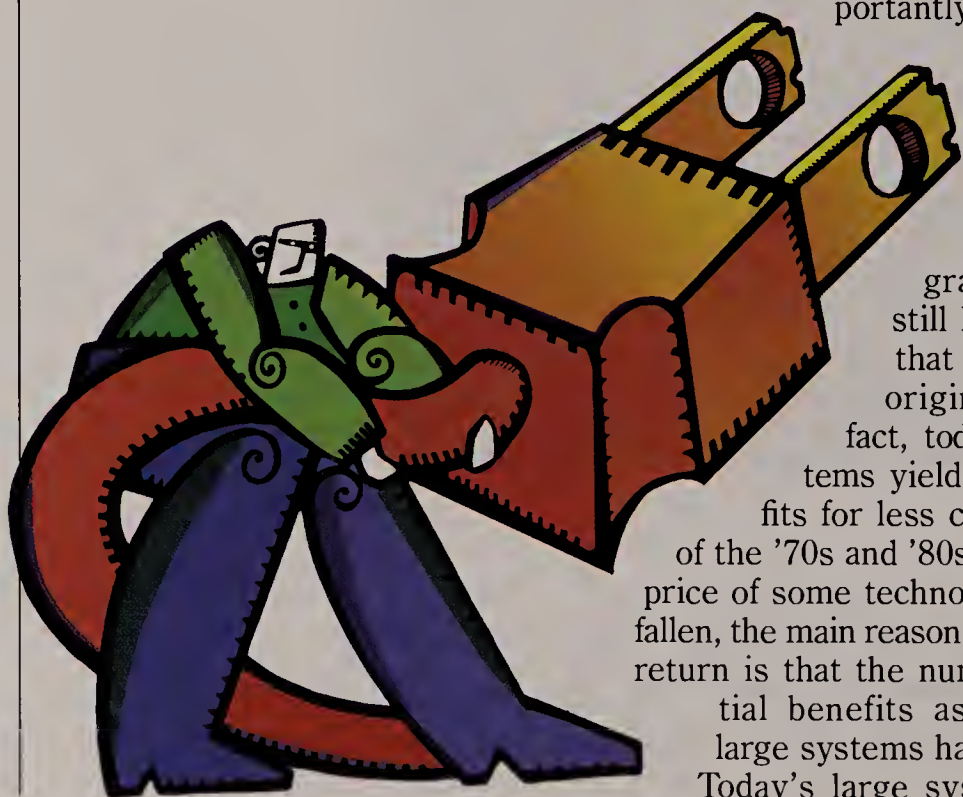
even better, more timely information; the ability to integrate and correlate internal and external information; and the means to facilitate streamlined business processes.

Such integration and flexibility are essential at a time when few companies provide single products for single markets. Multiproduct, multi-market companies cannot function effectively with standalone systems that support a single product. And companies cannot afford to let systems constraints cost them six months when launching new products or responding to competitors.

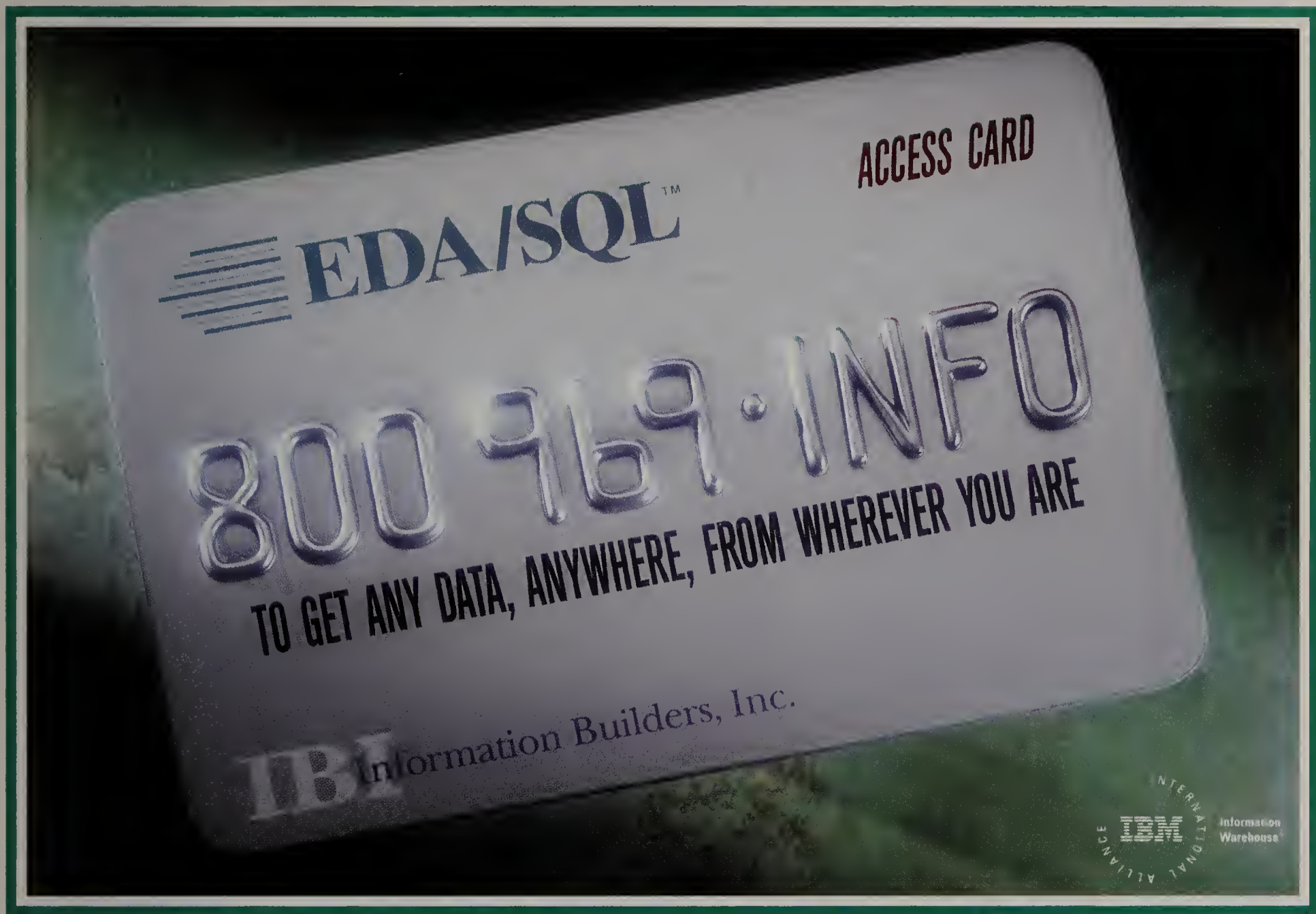
The apparent reason why most big-systems projects failed in the past is that the technology was just not ready. The hardware didn't have sufficient power to run large, integrated systems. In addition, early software-development tools were inadequate. Project costs and schedules often slipped by at double and triple the estimates, making for some extremely gun-shy developers.

Nor were there opportunities for IS executives to learn from the experience of a large development project. If a project failed, the developers never got a second chance. Managers of successful projects found the experience of building megasystems so traumatic that few wanted to go through it again. And even when they did want to repeat the experience, the opportunity rarely presented itself, since the majority of these systems outlasted their developers. Most companies only needed—and could only finance—one large, integrated system.

Another problem was the development approach itself. Over the past two decades, systems-development methodologies created by the big accounting firms have become standards for the industry. These method-



REACH OUT AND ACCESS EVERYTHING



EDA/SQL FROM INFORMATION BUILDERS: The Industry Standard Client/Server Solution That Lets Any Tool Access Any Data, Non-Relational or Relational, From Any Desktop.

INACCESSIBLE DATA IS USELESS

You've spent a lot of years and a ton of money building up the databanks you need to call on regularly to help run your business.

But, can you access your data fast when you need it?

Even worse, if it's on an incompatible platform, can you access it at all?

Chances are the answer is no.

HOW BIG BUSINESS LOOKS AFTER BUSINESS

Happily there's another answer to the problem. It's called Enterprise Data Access (EDA/SQL) from Information Builders. The people who specialize in distributed information systems.

EDA/SQL is a trademark of Information Builders, Inc., 1250 Broadway, New York, NY 10001

EDA/SQL extends the reach of desktop solutions. It enables virtually any application or end-user tool that supports SQL to transparently reach any data in non-relational database files from any workstation.

REACH OUT AND RETRIEVE

With so many SQL tools integrated with many of the proprietary databases, you need a standard method of access with the power and flexibility to extend their range across distributed, multivendor systems environments.

EDA/SQL lets you do it — and with both relational and legacy data systems, so your investment in all of your existing data is future proof.

Nothing else delivers this universal, flexible, access

capability in the day to day management of all your company's data.

So when you need to reach data, regularly, quickly, and regardless of platform, there's only one company to call.

Information Builders, the distributed information systems specialist.

For more information on EDA/SQL and how it can solve all your data access problems or to attend a FREE Seminar...

Call 800-969-INFO

In Canada call 1-416-364-2760

IBI  **EDA/SQL™**
Information Builders, Inc.

ologies were designed to avoid risk and were created with small to medium-sized development projects in mind. Often, companies chose them solely to keep their auditors happy.

Techniques like freezing the specifications, as well as inflexible project plans and overly detailed progress reporting, assured failure when applied to large-systems development projects. Systems were obsolete by the time they were implemented, because their design had been frozen years ago while the business kept changing.

Two dramatic changes in the last five years have helped pave the way for success in large-systems development projects: substantial advances in hardware and software technology and in technical expertise and creative approaches to development. The power of today's hardware has increased so greatly that IS executives can now buy their way out of many mistakes and inefficiencies. Software, too, has made great strides, becoming more flexible and easier to use.

Moreover, the available approaches to large-systems development are much more powerful. Big systems do not necessarily mean big hardware. Thanks to new capabilities in linking systems across platforms—the client/server approach—building large, complex systems is more like snapping small pieces into place than developing massive frameworks. Client/server technology reduces both cost and risk by allowing systems to be developed and delivered incrementally.

Not only are big systems easier to build, but the reasons for building them are more compelling than ever. The technology infrastructures of most major companies are creaking. In spite of heroic and creative efforts to extend their lifetimes, they will soon become more expensive to maintain than to replace. Contributing to this obsolescence is the accounting practice that dictates how software is depreciated (or not depreciated). This persuades companies to resist chang-

ing or upgrading their systems.

While old large systems are inflexible, smaller, non-integrated systems are ineffective for another reason. At a time when most companies sell many products to many customers, systems developed independently over time for each new

Two dramatic changes in the last five years have helped pave the way for success in large-systems development projects: substantial advances in hardware and software technology and in technical expertise and creative approaches to development.

product cannot provide a total picture of complex customer relationships. In other words, companies cannot remain competitive with either approach.

There is another compelling reason to upgrade legacy systems: Large systems can give American companies a competitive advantage over their foreign counterparts, many of whom are risk-averse. Risk is inherent in large-systems development, and most likely always will be. The important thing to remember is that not only are the potential benefits of big systems exponentially larger, but we have also become much smarter in managing that risk using improved tools and knowledge. Eliminating risk entirely would also eliminate much of the value. For example, companies can play it safe by using packaged software, but since

competitors can buy the same packages, that strategy provides no basis for competitive advantage. The trick is to know how to manage risk so it doesn't sink the project. This is something that American corporations are able and often willing to do.

This difference between the American and foreign business environments has benefited the United States tremendously in the world market. In the past 30 years, most new technologies have originated here. Intrepidity in systems projects has resulted in some of our biggest successes. Look at Citicorp's Payment Products Division, which developed a system that reviews total customer relationships across 42 products. General Motors' problem-communications system notifies engineering, assembly plants and suppliers in real time as problems in product development occur. And Wal-Mart's inventory system lets it analyze the sales history of any product it carries on a store-by-store basis.

The importance of such corporate courage is summed up in the following quotation from the Carnegie Corp. annual report of 1965:

"Anyone who accomplishes anything of significance has more confidence than the facts would justify. It is something that outstanding executives have in common with gifted military commanders, brilliant political leaders and great artists. It is true of societies as well as individuals. Every great civilization has been characterized by confidence in itself."

For those with the resources and the courage to develop them, big systems can be the key to competing in a highly dynamic market. Information executives need to be aware of what is available to them, in technology, skills and expertise. The rules have changed, and those who can make the transition will have a powerful competitive advantage in both domestic and world markets. ☐

David H. Starr is a vice president in the Financial Services Practice at TSC, a consulting firm based in Chicago.

YES! I WANT TO LEARN MORE ABOUT RIGHTSIZING FROM THE TOP DOWN. COUNT ME IN ON YOUR FREE SEMINAR!

Check the city/date of your choice.

- | | | |
|---|--|---|
| ☐ ALBUQUERQUE, NM
WED., MARCH 10 | ☐ KANSAS CITY, MO
TUES., MARCH 16 | ☐ ROCHESTER, NY
WED., MARCH 24 |
| ☐ ANCHORAGE, AK
FRI., MARCH 5 | ☐ LANSING, MI
WED., MARCH 3 | ☐ SALT LAKE CITY, UT
WED., FEB. 24 |
| ☐ BALTIMORE, MD
WED., FEB. 24 | ☐ LITTLE ROCK, AR
THURS., MARCH 4 | ☐ SAN ANTONIO, TX
TUES., MARCH 9 |
| ☐ BATON ROUGE, LA
FRI., MARCH 5 | ☐ MILWAUKEE, WI
TUES., MARCH 2 | ☐ SAN DIEGO, CA
WED., MARCH 3 |
| ☐ BOISE, ID
THURS., APRIL 8 | ☐ MINNEAPOLIS, MN
TUES., MARCH 23 | ☐ SAN JOSE, CA
FRI., FEB. 19 |
| ☐ BOSTON, MA
WED., APRIL 7 | ☐ NASHVILLE, TN
FRI., APRIL 2 | ☐ SPOKANE, WA
TUES., APRIL 6 |
| ☐ BUFFALO, NY
TUES., MARCH 23 | ☐ NEW YORK CITY, NY
FRI., MARCH 26 | ☐ ST. LOUIS, MO
FRI., FEB. 26 |
| ☐ CEDAR RAPIDS, IA
WED., MARCH 24 | ☐ OKLAHOMA CITY, OK
WED., MARCH 17 | ☐ TAMPA, FL
FRI., APRIL 2 |
| ☐ CHICAGO, IL
TUES., MARCH 16 | ☐ OMAHA, NE
THURS., MARCH 25 | ☐ WALNUT CREEK, CA
TUES., FEB. 23 |
| ☐ CINCINNATI, OH
THURS., MARCH 18 | ☐ PEORIA, IL
TUES., MARCH 30 | ☐ WASHINGTON, DC
FRI., FEB. 26 |
| ☐ COLUMBIA, SC
MON., MARCH 29 | ☐ PHOENIX, AZ
THURS., FEB. 25 | ☐ WOODLAND HILLS, CA
TUES., MARCH 2 |
| ☐ COLUMBUS, OH
WED., MARCH 17 | ☐ PHILADELPHIA, PA
FRI., MARCH 19 | ☐ MEXICO CITY, MEXICO* |
| ☐ FORT LEE, NJ
WED., MARCH 10 | ☐ PITTSBURGH, PA
FRI., MARCH 12 | ☐ SÃO PAULO, BRAZIL* |
| ☐ FORT WAYNE, IN
THURS., MARCH 18 | ☐ PORTLAND, ME
TUES., APRIL 6 | ☐ BOGOTA, COLOMBIA* |
| ☐ FORT WORTH, TX
THURS., MARCH 11 | ☐ PORTLAND, OR
WED., APRIL 7 | ☐ CARACAS, VENEZUELA* |
| ☐ HARTFORD, CT
TUES., APRIL 13 | ☐ PROVIDENCE, RI
THURS., APRIL 8 | ☐ KUALA LUMPUR,
MALAYSIA* |
| ☐ INDIANAPOLIS, IN
WED., MARCH 31 | ☐ RALEIGH, NC
TUES., MARCH 30 | ☐ CALGARY, ALBERTA* |
| ☐ JUNEAU, AK
THURS., MARCH 4 | ☐ RICHMOND, VA
TUES., FEB. 23 | ☐ EDMONTON, ALBERTA* |
| | | ☐ HALIFAX, NOVA SCOTIA* |
| | | ☐ MONTRÉAL, QUÉBEC* |
| | | ☐ OTTAWA, ONTARIO* |
| | | ☐ TORONTO, ONTARIO* |
| | | ☐ VANCOUVER, B.C.* |
| | | ☐ WINNIPEG, MANITOBA* |

Sign me up for the
Software AG free management seminar,
"Rightsizing Without Capsizing."

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

TELEPHONE _____

For complete information and
quick registration call
1-800-843-9534, ext. 200

International: 813-726-6474

*Dates to be determined. For further information call: 813-726-6474.

Software AG of North America, Inc.
11190 Sunrise Valley Drive
Reston, Virginia 22091



NO POSTAGE
NECESSARY
IF MAILED IN
THE UNITED
STATES

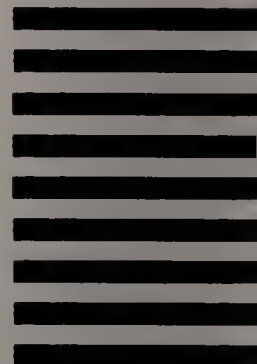
BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 2637 CLEARWATER, FL

POSTAGE WILL BE PAID BY ADDRESSEE



Executive Center
Suite 236
25400 US 19 North
Clearwater, FL 34623-9891





A BOTTOM-UP APPROACH TO RIGHTSIZING CAN TURN OUT TO BE JUST THAT.

A bottom-up approach to rightsizing promises to rescue users from a "host" of problems. But decisions outside a coherent organizational strategy can result in isolation and chaos—turning your business upside down.

Uncontrolled decentralization can lock you into platforms and software that force you to be reactive—to support systems lacking standards, integration, data integrity, recovery and security.

The alternative to this uncontrolled, revolutionary approach is an evolutionary approach. One that lets you be proactive. To fix what's wrong without losing what's right.

TOP DOWN RIGHTSIZING from Software AG empowers IS to design and deliver enterprisewide client-server solutions in multiple platform environments. Without retraining. Without restaffing. Without recoding.

The key is true application portability and integration linked with powerful networking facilities, yielding a time-proven implementation strategy. Top Down Rightsizing provides you with the flexibility and control to handle whatever is on the horizon—from a changing business environment to emerging technologies.

Learn to thrive, rather than survive, in these changing times. Find out more about

Top Down Rightsizing and implementation techniques. You'll see how Top Down Rightsizing from Software AG delivers the control and integration to keep your business rightside up.

FREE MANAGEMENT SEMINAR

Software AG invites you to
**"RIGHTSIZING WITHOUT
CAPSIZING"**

Seating is limited.

To reserve your place call:

1-800-843-9534, ext. 200

International: 813-726-6474

SOFTWARE AG
SOLUTIONS WORLDWIDE

Never doubt the resourcefulness of a person like Bill Inmon.

Bill's made a career out of quickly uncovering vital business information that takes even the sharpest data managers months to find.

information in a data warehouse is stored as a series of "snapshots" of operational activity. These snapshots can provide years of integrated historical information which make analyzing business trends and statistics much

minutes to complete, depending on file sizes.

Once installed, a data warehouse functions independently of the operational environment. And with Warehouse Manager's Metasource™, information is easy to organize and maintain.

**We bet Bill Inmon can
dig up information about your
company faster than you can.**



Bill Inmon, creator of the data warehouse.

His secret? The data warehouse. And the quickest way to build one is with PRISM Warehouse Manager™, an automation tool that's proving indispensable to high-level decision makers.

INFORMED DECISIONS BASED ON RELIABLE INFORMATION

The need for integrated, historical information has never been greater. But today's operational databases weren't designed for information processing. Typically, data is stored in various applications on several databases. So converting raw data into usable information takes forever.

A data warehouse, on the other hand, stores data in a single, integrated informational database. So you can get quick responses to your information requests and have a clear picture of overall business activity.

A HISTORICAL PERSPECTIVE OF THE FUTURE

Unlike data in the operational environment, which is routinely updated and purged,

easier. Without such a perspective, accurate forecasting is virtually impossible.

THE FAST TRACK TO INTEGRATION

Building a data warehouse manually is likely to take longer than you can afford to wait. Unless, of course, you use Bill's shortcut.

PRISM Warehouse Manager automates the entire building process. Data is automatically extracted, summarized and restructured to load the data warehouse in either a main-frame or a client server environment.

PRISM also offers on-site consulting, capacity planning and PRISM Generic Data Models™ which eliminate the time-consuming task of developing a custom data model.

A LOW-MAINTENANCE SOLUTION

Warehouse Manager won't disrupt operational activity. It simply scans and copies information before moving it into the data warehouse. Data sweeps are conducted when processing activity is minimal and take just

A COST-EFFECTIVE WAREHOUSE IN FIVE SHORT DAYS

Because Warehouse Manager is automated, you eliminate the cost of writing code by hand or learning new languages. And with your staff spending more time analyzing information, and less time searching for it, productivity will increase tenfold or more.

But don't just take our word. Let us show you with our Warehouse Manager Pilot Program. We'll send our specialists—for up to five days of free consulting—to help you build your very own trial warehouse.

The challenge stands. Bill says if you're up to it, call us.

**Call 1-800-995-2928 for more
information about building your own
data warehouse in just five days
or to get our free Tech Topic entitled
"What Is A Data Warehouse?"**



PRISM



The Conduct of Code

Creating effective, relevant software applications requires a significant commitment from a number of parties. Senior IS executives whose organizations are moving to distributed computing must in effect remake their staffs while downsizing and increasing service to users. The developers themselves must learn new skills or fall by the wayside. And users are being co-opted to participate in the development process for systems that will be critical to the success of their own efforts.

The Burdens of Leadership

The pressure to manage people skillfully has never been greater. CIOs are experimenting with a range of organizational and motivational strategies to recast the collective skill-sets of their shops. They must also try to match up the people they manage with people they don't: the end users.

PAGE 28

Willing Hands in the Engine Room

Today's programmers understand the shifting sands of competition and are willing to support strategic change. All they ask in return is a little management support in the areas of motivation, education, user integration and evaluation.

PAGE 36

An Uneasy Alliance

As uncomfortable and confusing as it may be to work in new ways with technical people outside of one's department, end users must get involved in systems development in order to make sure they get the systems they need.

PAGE 50

Productivity at Perdue

In the past three years, Perdue's software developers have become significantly more productive. Most of the gains are the result of cultural changes emphasizing communication, training and education.

PAGE 60

Tool Techniques

It's a delicate task: Find the right balance between assembling a single set of automation tools for the creation of all business systems and laying in a new set for each project.

PAGE 70



EXECUTIVE ORDERS

The Burdened Boss

BY THOMAS KIELY

Changing technologies are tough enough, but it's the people problems that keep me awake at night. I have employees in the Cobol boiler room, stoking my legacy systems. They know that what's happening in development is happening elsewhere. They know the world is changing. Some don't care; their pink slips are in my tickler file. Others want to move, but I need them where they are. For now. It's sad; it's scary. Employees with new skills are rolling out distributed systems, downsizing applications and supporting reengineering projects, and they're brushing up against end users. But my folks can't talk business and never learned what the word "customer" means. And end users—meddlesome, nettlesome end users—are my heaven and my hell.

"I can see for miles, but all I see are hedgehogs."

For years, managers could organize and motivate people by the book: hire folks with the right skills, make sure they do the job, promote some of them, fire some of them. It wasn't rocket science.

It's rocket science now.

Team-building training. Contract labor. Pair-

ing up in-house developers with outside vendors. Revising performance measures. These are just a few of the strategies pursued by CIOs as they grapple with the knotty challenges of managing software people in an age of changing technologies.

Change, often dramatic change, is sweeping through all manner of industries, and executives everywhere are trying to cope with their people—even as they stumble over them. In information systems, managers are pushing new skills on their software developers while downsizing their staffs and increasing service to internal customers. IS executives are trying to teach new corporate cultural agendas to their employees when they themselves don't entirely comprehend the meanings of the new dogmas. They are trying to team up the people they manage with people they don't (end users), and, like novice matchmakers, they are bewildered by the unpredictability of the chemistry. Very often, the managed aren't delighted with the changes.

The pressure to manage people skillfully has never been greater, say a number of CIOs. Still, IS executives are experi-



menting with a range of organizational and motivational strategies to recast the collective skill-set of their shops. Often, these strategies are intertwined with cultural changes underway in the larger organization.

At Bell Atlantic Corp., for instance, CEO and Chairman Raymond Smith is nurturing a dramatic sea change in the corporate culture. Smith's ambition, dubbed "The Bell Atlantic Way," is to transform the Philadelphia-based regional Bell telephone company from a functional-minded organization into one that is streamlined, fluid, flexible and customer-focused. The conventions of this revolution are teams, reengineering and employee participation—and managers throughout the company, including IS executives, are expected to be in the front ranks of Smith's crusade.

"The responsibility that managers have to constantly drive the message and create the new culture is reflected in their performance evaluations," said Mark Wegleitner, a vice president who heads up Bell Atlantic's systems architecture and standards group, one of six IS denominations within the company. Wegleitner is pushing his staff to get closer to their customers—end users—à la The Bell Atlantic Way. His software developers now sit down with end users and jointly define such elements as graphical interfaces. Another Bell Atlantic IS group persuaded a few employees from an internal customer department to join IS, where they now help shape a customer-driven focus.

But Wegleitner is also pursuing technological change in his department; in the process, he is unearthing some motivational

CIOs are experimenting with a range of strategies to recast the collective skill-sets of their shops.

ILLUSTRATION BY NICHOLAS WILTON

conundrums that could undercut his efforts to spur his staff to cozy up to the customer. The gradual move to distributed computing requires him to both push some of his employees to learn the new skills and hold others back. While most of his staff are eager to learn new skills, they can't all

Change, often dramatic change, is sweeping through all manner of industries, and executives everywhere are trying to cope with their people—even as they stumble over them.

learn at once. He has hired contract labor to handle mainframe duties, freeing up more staff for new-world computing, but he still needs to balance present needs—legacy systems, some of which are being consolidated—with future needs. This means that some staff move ahead and others stay behind, at least for now. "It has to be carefully choreographed," Wegleitner said.

"More people want to move [to new computing jobs] than there are jobs available," said Clif Heady, director of management systems, human resources and training in Wegleitner's group. Heady says his department plans to map out the IS positions they will eventually need, at a variety of geographic locations, so that staff can target the jobs they want and develop the skills they will need to compete for them.

IS executives adopted a different strategy for promoting change at Chrysler Corp. in Detroit. The carmaker dramatically reorganized IS and pushed education and metrics. Chrysler has two large corporate IS groups: A highly centralized IS department handles corporate technology needs; a second group handles critical engineering needs, such as computer-aided design and computer-aided manufacturing systems. The centralized IS operation is also divided into two segments: one for telecommunications, a second for applications.

By early 1992, the applications side of IS had shed its old organizational chart, designed around traditional IS functions, and reorganized around seven business processes, such as assembly and manufacturing support, dealer operations, management control systems and so on.

"The reaction among IS staff [1,150 peo-

ple] was a mixed bag," admitted Ken Quint, manager of the assembly and manufacturing support IS group. "One reason we did this, candidly, was to take layers out of the management structure. Also, there are concerns by people who see their roles diminished or changed under the new structure. But the primary reason for doing this was to get closer to the customer"—a mission shared by senior managers throughout the company.

That was a point hammered home to IS staff through a series of training programs. The business of application development was even recast to more closely meet the department's new customer-focused mission. Now, end users work together with IS facilitators to call the requirements shots in joint application-design projects, or work with IS staff members who have been colocated—living with end users, but reporting back to IS.

Teams abound in the new IS environment at Chrysler. But IS managers quickly realized that some teams worked better than others. Experience was the hidden factor: Some teams sputtered for a long time, finding their balance, before they finally got down to work. So IS managers hired consultants to train employees in team processes. "That had dramatic results [in productivity]," Quint said.

Quint knows—because he can see results in black and white. IS is steeped in metrics at Chrysler. Resource management, the business benefits of systems, development processes, product service and quality—all are measured closely, using sets of metrics designed by a team of end users and IS staff. Metrics are also benchmarks: Here is what we did last quarter; how do we jump higher next quarter?

The Massachusetts Mutual Life Insurance Co.'s novel approach to drawing customers closer to IS mixes new technologies with internal marketing schemes. The IS department at MassMutual (headquartered in Springfield, Mass.) maintains an advanced-technology laboratory where new products are scrutinized for their applicability to corporate systems. But it also sparks technology awareness among end users.

Lotus Notes, for example, is one of the technologies currently under review at the lab. IS employees in the lab want to make certain that the product fits, technically, with one or another of the company's di-

verse platforms (which include systems on mainframes, minicomputers from a variety of vendors, and PC LANs). But that's not all. As with any new product, the IS staff wants to learn all the ways the technology could be used within the company and what kinds of things to anticipate: upgrade and support costs, backup and recovery issues, and so on.

While the lab staff pokes and prods the

IS executives are trying to teach new corporate cultural agendas to their employees when they themselves don't entirely comprehend the meanings of the new dogmas.

technology, IS managers pump up the volume with end users. They invite employees from across the company to attend technology-awareness briefings where IS staff discuss what the technology will do now and what it might do in the future. Teleconferencing and multimedia were the subjects of two recent briefings. Peter Daboul, senior vice president for IS at MassMutual, also regularly updates senior business line executives on the lab's ongoing investigations. "End users have begun to come to us now, to talk about technology ideas they've heard about," Daboul said.

Dow Chemical Co. has gone one step further and involved an outside vendor as a third party. Don Pirkle, vice president of IS at the Midland, Mich.-based chemical giant, notes that his department is laboring to make applications supporting nine critical business processes integrated and global. Where possible, Dow wants to buy applications rather than make them. So it has teamed up with SAP America (a subsidiary of SAP AG International, of Biel, Switzerland) on two global projects: an accounting system and an order-entry management system. SAP staff help to train Dow developers assigned to the project—and end users affected by the systems—and work directly with Dow developers to modify and customize the SAP platform.

This has changed the way developers on the two partnership projects work. Where once they designed applications, now they modify existing ones. They have had to de-

Plan of Attack

In order to develop systems that will serve the business, IS executives need to get users involved in the process and recast the skill-set of IS staff

- ▶ **Reorganize** the department around business processes, not traditional IS functions.
- ▶ **Hold** technology-awareness briefings to educate users about the current and future uses of technology.
- ▶ **Recruit** users to join IS in order to develop a more customer-driven focus.
- ▶ **Co-locate** IS staff in user departments.
- ▶ **Hire** consultants to train employees in team processes, and have developers and users work together in designing applications.
- ▶ **Use** vendor expertise to train IS staff and users in modifying and using third-party products.
- ▶ **Use** IS/end-user teams to develop metrics and benchmarks.
- ▶ **Map out** positions the organization will eventually need so staff can target the jobs they want and develop the skills they will need to compete for them.
- ▶ **Change** performance measures and incentives and establish career-development paths to match the new skills required.
- ▶ **Provide** training and send staff to conferences.
- ▶ **Hire** contract labor to handle mainframe duties while staff learn about and develop the new systems.
- ▶ **Weed out** "mainframe bigots" and make sure new hires come equipped with client/server skills.

velop new skills (including the ability to perform on project teams) and accept new job descriptions. To motivate them, Dow changed performance measures and incentives. Now, among other criteria, developers are evaluated on how well they act as consultants to end users.

It hasn't been easy. Dow is still maintaining legacy systems, so only a portion of Dow's 2,000 IS employees have had to change their spots—although Pirkle assays that these two projects herald the future of IS at Dow. "If you take people who build software and put a package in their hands,

they tend to want to modify it quite a lot," said Pirkle. Dow has changed incentives to encourage developers "to feel good about not modifying the software and to find solutions within existing functions in the package to get the job done." Pirkle has also beefed up the training developers receive.

Chevron Canada, in Vancouver, has also

Soper banished the mainframe manuals to a back room and positioned all the PC manuals—and lots of PC magazines—front and center in the IS office. At Chevron Canada, programmers know clearly what the future will be.

tried carrot-and-stick incentives to nudge software developers to learn new skills. The IS shop at Chevron has been moving steadfastly into new client/server environments over the last three years. First the carrots: In 1991 and 1992, Bill Soper, manager of information services, sent several of his key programmers off to conferences—a real morale boost. (One mainframe programmer who has become an enthusiastic convert to new computing is held up as an example in the IS shop.) Soper also decided to let his people find their way forward slowly rather than setting stringent guidelines and commitment schedules. And he provided substantial training.

Then there were the sticks: Soper fired a few sluggish mainframe bigots and brought in contract labor to work maintenance. He hired new staff with client/server skills and pointedly did not hire mainframe personnel. He also banished the mainframe manuals to a back room and positioned all the PC manuals—and lots of PC magazines—front and center in the IS office. This was done primarily for end users—who are becoming more involved in IS projects at Chevron—but also as another iteration of the message. At Chevron, programmers know clearly what the future will be.

Technology staff at Harvard University saw the future clearly too, when the Cambridge, Mass.-based campus began moving toward decentralized client/server computing. But they had a say in how the university got there. Early in the transition, Harvard established a task force, composed of management and staff, to look at quality-of-life issues for technology staff. The

task force drew up recommendations for changing incentives and establishing career-development paths and merit programs; Harvard followed many of the recommendations and is working on others.

Training was another issue. Ironically, although Harvard's business is education, the IT budget for education and training is tight. The department's staff of 240 receives a week or two of training a year. Stephen Hall, director of Harvard's office for information technology, said that much of the training that occurred during the move to a distributed architecture was on-the-job. But that may have been a plus: MassMutual's Daboul says hands-on training provides an urgent context for what is being learned. Preplanned training is too abstract, in his opinion, and does not stick.

Finally, at Cedars Medical Center in Miami, the battle to inculcate new development skills has already been won, and the next battle—customer focus—is underway. David Libenson, vice president and CIO for the hospital, notes that his employees have become primarily integrators, not developers. "We don't write software," he said. "We take existing packages and integrate them with our rich mix of systems"—which include a sophisticated Unix-based office-automation system and a digitized voice system that allows doctors to dictate patient notes. (Well-indexed, the system allows doctors to begin their rounds by reviewing audio records, accessed through their car phones.)

Now Cedars Medical is in the midst of an organizationwide continuous quality improvement (CQI) push, and IS has been a party to a number of quality projects—often prompted by the customer. Staff nurses, for instance, pushed for a revision of a patient order-entry system, then sat on the project team along with IS staff.

"In IS," said Libenson, "we realized that if we're not providing direct patient care, we're providing support to someone who does." All projects now begin with a multidisciplinary team. The language of CQI—metrics and charts—helps them to work together with a common vision.

Whatever the tactics for achieving that vision—multidisciplinary teams or carrots and sticks—none are silver bullets. "Changing the culture takes time and patience," said Chrysler's Quint—and lots of it. Because, ultimately, "people have to change at their own rate." CIO

THE CIO PERSPECTIVES SERIESsm

The POLITICS of IT: Reordering the Enterprise

The mood of America has changed. In response, we've elected political leaders who reflect this new spirit. Corporate leadership has come under tremendous pressure. With the spectre of information haunting organizations, there isn't any doubt that the CIO will have to make changes based on a new constituency.

To ignore politics can be fatal. Which is why we are focusing our fall *CIO Perspectives* conference on the politics of IT. Jack Kemp, David Kearns, and the heads of information technology from Viacom International, Kentucky Fried Chicken and United States Metalworks—to name a few—will address politics in their own organizations. And Rich Tennant, editorial cartoonist, will help us look and laugh at politics in our own companies.

Mark your calendar—October 17–20. Join the leaders in technology, business, public service and humor. See the newest technology and hear the most current thinking on the development of strategic systems. And find out why politics plays such an important role in your organization.

October 17–20, 1993
Westin Mission Hills
Rancho Mirage, California

For more information, or to enroll

Call 800-366-0246

Corporate Hosts

BOOZ·ALLEN & HAMILTON

**COMPUTER
ASSOCIATES**
Software superior by design.

EDS

TAKE ADVANTAGE OF CHANGESM

**hp HEWLETT
PACKARD**

Racal-DatacomTM

Sun

**TEXAS
INSTRUMENTS**

CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

Our competitors can help automate and
manage this part of your enterprise.



We can do that.
Plus this.



Only Boole & Babbage offers you single-point control over your entire enterprise.

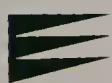
In your universe of increasing client/server based applications, there are a number of companies who lay claim to enterprise automation and management; but a cursory glance will tell you they're talking about either the mainframe part, network part, or workstation part, etc. With the possible exception of Commander Riker, *no one* can help manage the entire enterprise but Boole & Babbage.

Your unwieldy multi-vendor environment has created an increasingly complex enterprise; one in which only Boole & Babbage can give you the technology required for the single-point control and automation necessary to manage your mission-critical applications.

Boole & Babbage provides highly integrated products that can manage service delivery to virtually any IS enterprise. *Today.*

These unique capabilities represent a quantum leap in your ability to handle mission-critical applications. And, in the "doing-more-with-less" nineties, the difficulty of providing cost-effective service demands that you explore bold new ways to accomplish this task.

To our knowledge, you have only two current alternatives: Boole & Babbage, the enterprise automation company, or Commander Riker. Our number is 1-800-544-2152. His is classified.



**Boole &
Babbage**



PROGRAMMER'S PROGRESS

The Willing Technician

BY RICHARD PASTORE

F*or nearly 10 years I've toiled in this ivory tower, happily cut off from the office hubbub and petty user squabbles. I poured my soul into my Cobol craft till I stood without peer. Now you tell me to abandon that expertise and start from scratch in some new environment. You tell me to leave my tower and tread the paths of users. All I can say to that is—sounds great, when can I start?"*

Yes, you heard right. Joe and Josephine Programmer—the lifeblood of the software that drives today's organizations—are not the lumbering Luddites one might think. They understand the shifting sands of competition and are willing to support strategic change—things like business-process reengineering, client/server migration and customer-focus initiatives. All they ask in return is a little management support in the areas of motivation, education, user integration and evaluation.

Motivation is the crucial first step in effecting any strategic change. For many programmers, the chance to work with state-of-the-art software and systems is more than enough incentive to leave the mainframe rut behind and embrace downsizing. "I welcomed it," said Jim Knight, who turned his back on eight years of Cobol programming to help lead New York-based Home Insurance Co.'s foray into downsized development. "To see that happening and be part of it was nothing but a breath of fresh air."

Managers can sweeten the allure of new technology by granting programmers more

flexibility. "We were given leeway to do what was needed, and we didn't have to justify everything we did," said Larry Dreher, senior systems analyst at Mortgage Guaranty Insurance Corp. in Milwaukee. The traditional bureaucracy of the mainframe development environment was suspended for Dreher and other programmers who volunteered to work with the company's new client/server architecture and Andersen Consulting's Foundation computer-aided software engineering (CASE) tool. Without this free hand, Dreher said he might not have signed up for the project.

Developers also find strong motivation to change in the perks of working on high-visibility projects. "It's an ego thing," Knight said. "You're seen as one of the better people in the department if you're asked to work on a project like this." The flip side is that more eyes are watching you if you screw up, he added. But management can provide a comfort zone by guaranteeing programmers the chance to return to their old jobs if the new project fails.

When a high-profile project does go well, the desire to make the leap becomes con-



tagious. "After seeing what we accomplished, how easy and fast programming for client/server is, lots of programmers wanted to get in on this," said Jim Busch, a former programmer at North Carolina State University in Raleigh, who piloted client/server tools from Powersoft Corp. and Sybase Inc. in 1991.

But motivational techniques can also backfire, sowing seeds of cynicism among developers and undermining their commitment to change. "Programmers are not fooled by hype," said Richard Torres, former lead programmer at Blue Cross/Blue Shield of Massachusetts and now a consultant with Coopers & Lybrand's Computer Assistance subsidiary in Wellesley, Mass. To promote its System 21 system-consolidation initiative, Blue Cross papered corridors with slick posters touting the supposed benefits of

the snafu-ridden project. "There was really no other direct communication from above, and the posters just created more cynicism among the IS staff," who had nicknamed the project the "Stealth Bomber" because of its cost overruns, Torres said.

Once motivated, programmers making the transition to new development environments desire extra time to absorb the choice of tools at their disposal and learn both their basics and their nuances. But IS managers are sometimes stingy with time during this learning phase. "Everybody wants to fit [client/server] development into a standard mainframe metaphor; they just don't understand the complexity of the new tools we're using," said Nancy Caraher, technical developer at E.I. du Pont de Nemours & Co. in Wilmington, Del. "You have to keep telling them it's not going to be that

Programmers need management support in the areas of motivation, education, user integration and evaluation.

ILLUSTRATION BY DAVE LAFLEUR

"Power Unit Pricing maximizes Chesebrough-Pond's resources and gives us the flexibility to expand and grow our network. This means CA is listening to our needs."

*E. E. Goodmaster
Director, Management Information
Chesebrough-Pond's USA*



It's About Time.

That somebody found a better way to license software.

So we did.

We've created a whole new family of software licenses for all of our clients: large, medium and small.

These new licenses are like a breath of fresh air. They're flexible. Practical. And economical.

Designed for the way you use software in the 90s, all of these new licensing programs offer you something you've never had before.

The freedom to choose how and where you use software.

So from now on, when you run your software, it won't be running you.



Call 1-800 CALL CAI, Ext. 105
For This Free Brochure.

**COMPUTER
ASSOCIATES**[®]
Software superior by design.

way." Caraher has been working with a team using image-processing tools to reengineer workflows, and at the same time trying to educate users who are newcomers to PCs. This strained schedule leaves less time than she'd like for training in underlying technologies such as the Unix operating system and the C coding language.

Programmers exploring new development

"Everybody wants to fit [client/server] development into a standard mainframe metaphor; they just don't understand the complexity of the new tools we're using."

—Nancy Caraher

environments also appreciate a little leniency from their bosses. By lifting the pressure to deliver on strict deadline, managers encourage developers to become thoroughly grounded in new technology or programming practices. "Their patience pays off in the long run because the expertise we gained we can now pass on to other development groups, showing them more efficient ways of doing things," said Wayne Fowler, principal programmer analyst at NCR Corp. in Dayton, Ohio. "If we were on an inflexible deadline, these savings would never be realized because we would never have had the time to find them."

Though being lenient makes sense, many CIOs' good intentions fall victim to bottom-line pressure to hurry things up. "When the first blip appears, and it seems the project might cost more, it's 'forget the theory B.S. and start writing the programs,'" said Robert Binder, president of Robert Binder Systems Consulting Inc. in Chicago. "The managers' overriding concern is results per interval of time. It's the quality of the work that gets shortchanged."

One of the most profound and difficult changes being asked of programmers is that they increase the frequency and quality of their interactions with users. This IS-customer integration requires a change in attitude for many developers, who traditionally are uncomfortable around users. "We have to be more open-minded in listening to people who are not computer-literate, and that's very hard sometimes," Caraher said.

Programmers agree that one of the best

ways to enhance IS-user relationships is to study users' day-to-day duties. Toward this end, more and more developers are relocating to the user's environment, either temporarily or permanently. As part of a close-to-the-customer initiative, Blue Cross of Massachusetts sent some of its programmers to users' regional offices for a working visit. "We sat there with them and did actual work rather than just talking," Torres said. "Just by being in their working environment, we could pick up on their workflows." Torres noted that the time was well spent because management had had the foresight to draft a work agenda for the visit.

Not all developers are willing or able to embrace close user relationships. "For the older programmers, it's tougher not to patronize the users and to take their concerns seriously," Torres said. At Blue Cross, a motivational pep talk had little effect on some programming veterans, who were subsequently excluded from user visitations.

Permanent relocation to functional areas is perhaps the most dramatic and traumatic change being required of programmers. At Unisys Corp. of Blue Bell, Pa., central IS programmers were assigned and physically transplanted to user departments nearly two years ago to work within self-directed multidisciplinary teams. A rotation schedule transfers developers from one user area to another every 18 months to ensure a broader familiarity with all business functions. "The idea was to leverage IS expertise into the user community," explained Robert Leto, director of operations support for Unisys in Roseville, Minn.

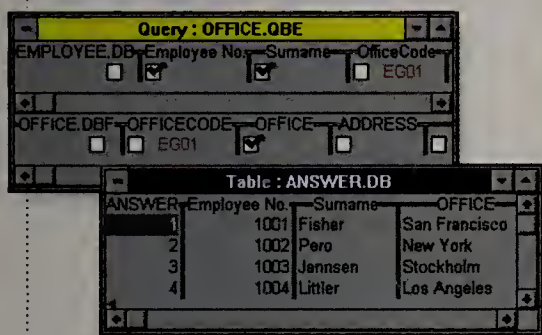
The trauma was somewhat mitigated thanks to the organization's previous experience in implementing a total quality management (TQM) program. "All the people skills, team skills and facilitator skills we needed were already in place because we had been doing TQM," Leto said. Even so, it still took a year of study and preparation before Unisys made the change. "The hardest part was getting managers on both sides to let go and allow the teams to be self-directed."

The concept has since won high praise for Unisys, including consulting firm Ouellette & Associates' annual prize for "Developing the Human Side of Technology." But programmers acknowledge the change was discomfiting. Michelle Nakano, a Unisys information systems analyst, received a cool

Introducing Borland's Paradox for Windows

Database power made easy

Paradox® for Windows makes it easy to manage, reach, and analyze your business data. And do it in new ways that dramatically improve productivity.



▲ Get answers quickly by using graphical Query By Example.

With Paradox for Windows you create reliable data management solutions that really keep your business humming. Build customer lists in seconds, auto-

Contains 3.5" high-density disks, 5.25" free by exchange.

NEW!



- #1 Award-winning database
- Build database applications fast
- Get quick answers to queries
- Create dazzling forms and reports
- Save time with Object Inspector™
- Connect to networks instantly
- From the PC database leader

Borland Paradox® for Windows

Relational database power made easy

OBJECT COMPUTING NOW!

matically generate reports with the push of a button, or quickly retrieve information from different databases. From letters to labels to mission-critical applications, Paradox for Windows puts your business data to work like never before.

It's easy to get at all your data

Paradox for Windows works "hand-in-glove" with its award-winning predecessor—Paradox for DOS. In fact, you can view, edit, query, and link to all your corporate data,

including dBASE®. You make your request for data simply by checking off boxes with easy-to-use Query By Example.



▲ The SpeedBar™ icons provide convenient point-and-click access to the features you use most often.

More people trust their data to Borland than all other database companies combined. That's why Borland is the Data Company. If you're looking for the best relational database for Windows, then put the power of Paradox to work for you today. You'll be amazed at what you can do.

Special introductory offer.

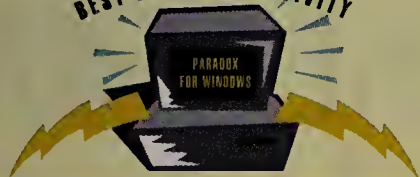
Offer expires April 30, 1993.

\$139⁹⁵
(Regular list price \$795.)

See your dealer or call now, 1-800-336-6464, ext. 5534

In Canada, call 1-800-461-3327.

BEST DATA CONNECTIVITY



Paradox is the best Windows database

	Paradox	Access
Performance		
Insert 1,000 records*	29 sec	147 sec
Range selection: 15,000 of 130,000 records*	<1 sec	16 sec
Complete Paradox and dBASE file support	✓	
Visual data modelling for forms and reports	✓	
Object-oriented development environment	✓	

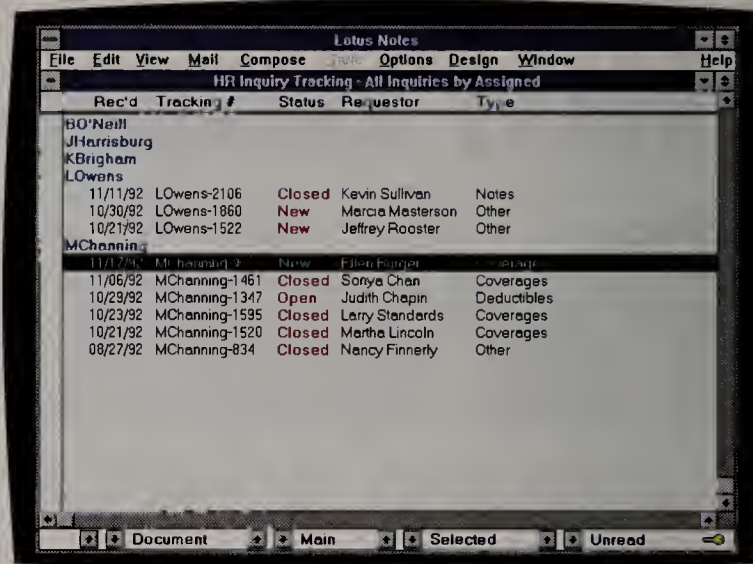
*All tests run on IBM® PS/2 Model 70 386/20 mhz, 4Mb RAM, Novell 3.11 NetWare, Ethernet network. Special offer good in the United States and Canada only. Prices in U.S. dollars. Dealer prices may vary. Copyright © 1993 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. BI 5311

Borland Paradox® for Windows

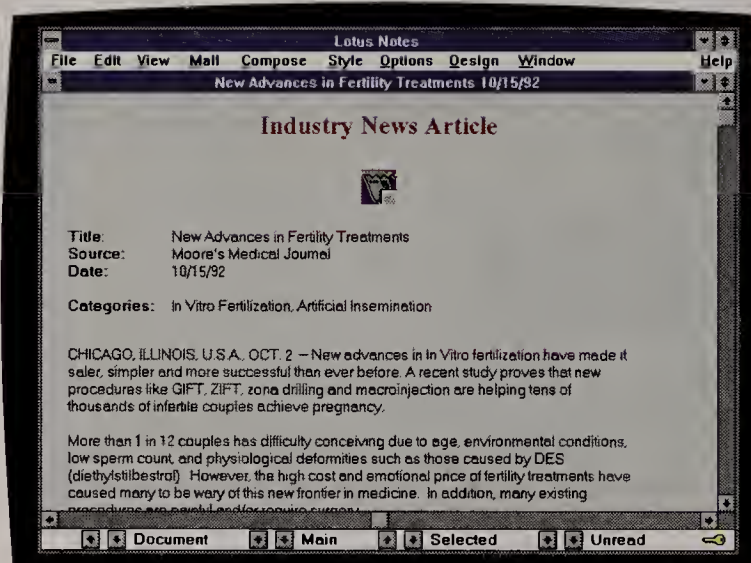
90-DAY
GUARANTEED
MONEY-BACK



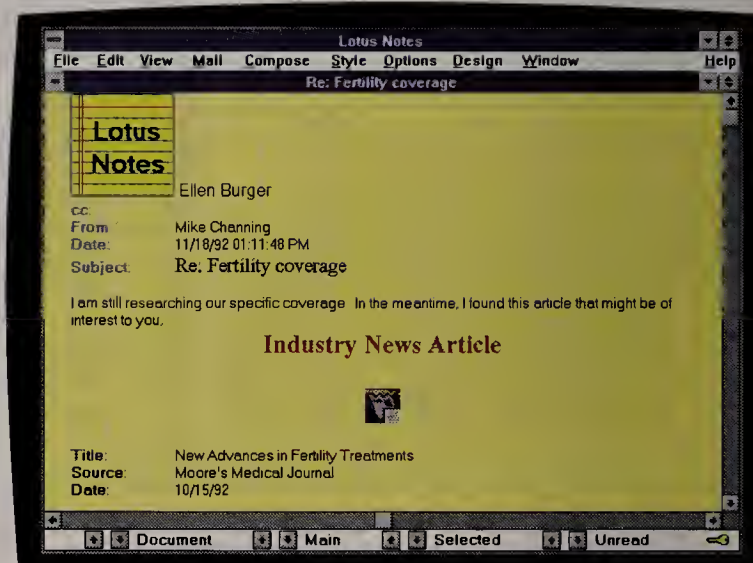
1. This is Mike's Notes desktop. Each icon represents a different database. In the course of the day, these are the ones he uses most frequently. To start the day, Mike decides to check if any new benefits questions have been forwarded his way. He double-clicks on the HR INQUIRY TRACKING icon.



2. Well, there's one that hasn't been read. Ellen Burger has a question about her coverage. Ellen called the company's BENEFITS HOTLINE. The operator entered her query into Notes and it was automatically routed to Mike. Mike double-clicks to find out what the problem is.



5. He simply double-clicks INDUSTRY NEWS, and searches two categories: In vitro fertilization and artificial insemination. First up is a recent story from Moore's Medical Journal. Since the article includes authoritative information, he decides to forward it to Ellen.



6. Mike quickly composes a note and forwards this document directly to Ellen. That done, he gets himself a cup of coffee.



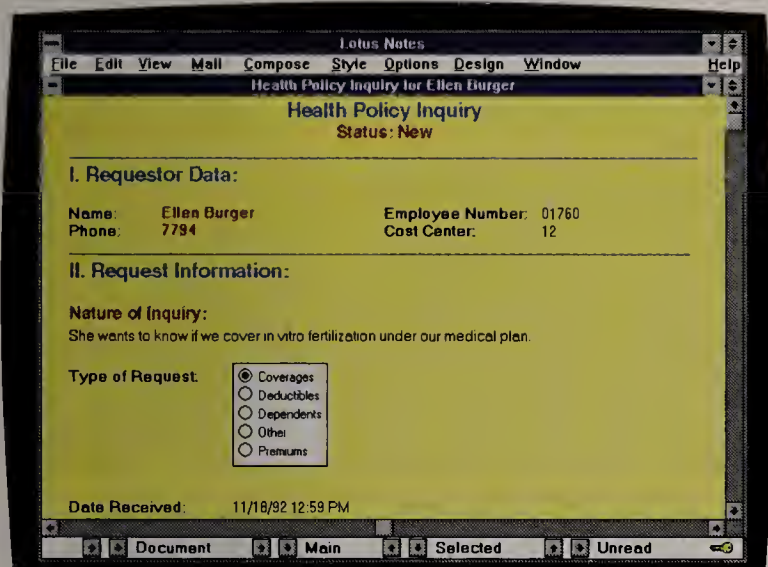
Mike Channing
Benefits Liaison

To demonstrate that had to make an

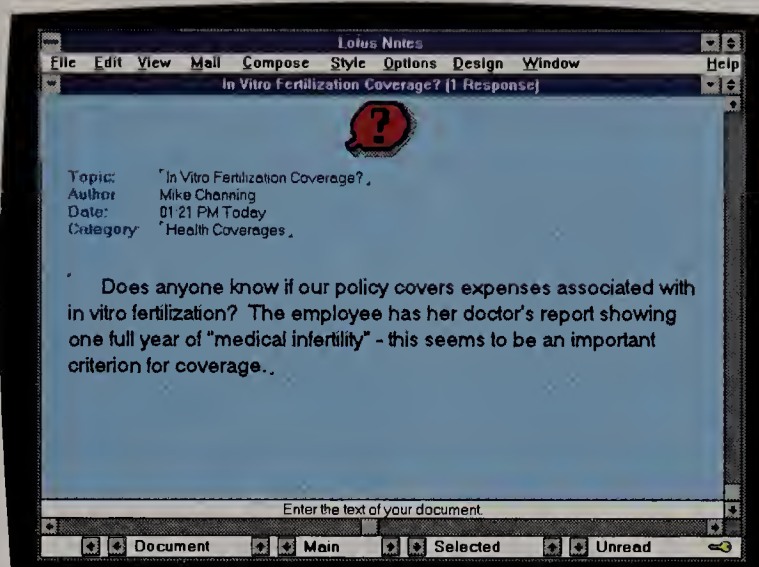
According to critics, including our competition, Lotus Notes® is one of the most exciting software products you can buy. We'd like to show you why.

More than an application development environment and much more than e-mail, Notes enables users to share knowledge anytime, anywhere. With it, you can build a new class of networked applications, without special programming skills.

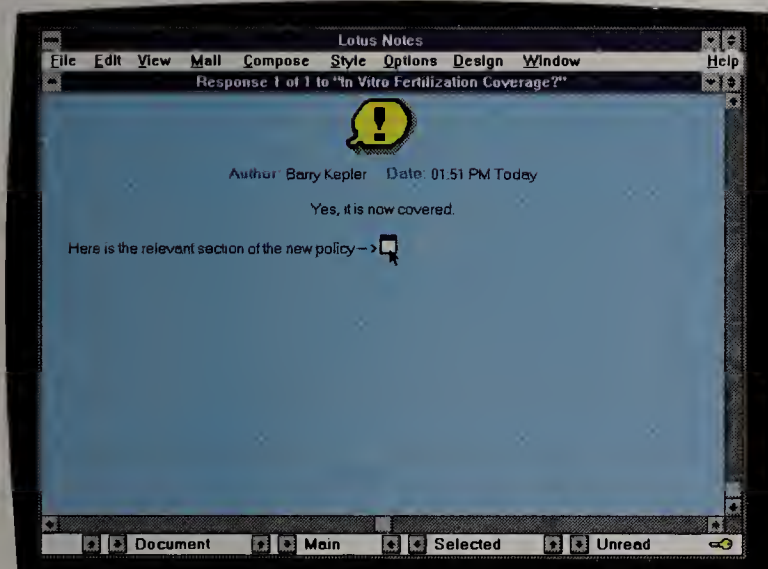
Let's watch how Mike Channing uses it: As a tracking tool for customer service. As a conferencing system for collaborative problem



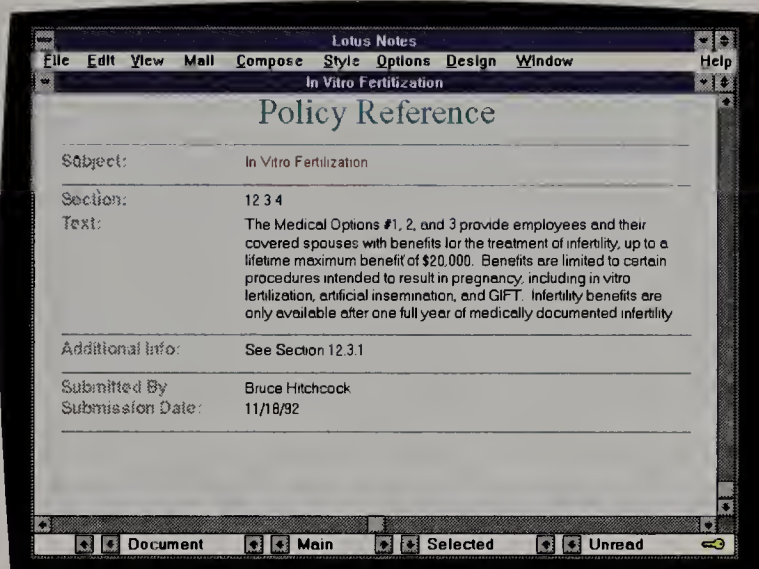
3.  Up comes the inquiry screen. Ellen wants to know if the company covers in vitro fertilization. Mike, being new, is stumped. He calls his supervisor on the phone for the answer. He's not in yet. Instead of waiting, Mike decides to post the question on the GROUP DISCUSSION database, thinking that someone else might know the answer and respond more quickly.



4.  He double-clicks the GROUP DISCUSSION icon. Once in GROUP DISCUSSION, he poses the question to his workgroup. Eager to help, Mike then decides to check out the INDUSTRY NEWS database for any background information that might be useful to Ellen.



7.  When he gets back to his desk, Mike checks back into the GROUP DISCUSSION database for responses. Not only has Barry Kepler responded with the answer, Barry actually leads Mike to the relevant section of the corporate policy manual by creating a direct link to the document.



8.  Mike clicks the DOC LINK icon. Up comes the relevant section of the policy. Mike jots a quick message and forwards both to Ellen. Job done, in less than 10 minutes, by easily tapping into expertise both inside and outside the company.

the power of Notes, we example of Mike.

solving. And as a library for policies, documentation or news.

Watch how Notes organizes information so it's easy for Mike to get the answers he needs. How effortlessly he taps his workgroup's knowledge. How quickly he accesses conventional references. Now you can see why people who have Notes build their work around it. And why the companies that have installed Notes have seen as much as a 400% return on their investment.*

Now, consider that any business can afford it. A Notes Group Pack™ will have ten people working together for under

\$5000. It includes 10 of our most popular Notes applications including SALES MANAGEMENT, CALL DISPATCH and GROUP DISCUSSION, as well as complete installation and usage documents. For information call **1-800-872-3387, ext. 8419**, or your local Notes VAR.

Lotus Notes

Field of Teams

The spring lineups feature depth at the power positions and solid contributions from the utility players

Major league baseball's Florida Marlins and Colorado Rockies aren't the only teams debuting this spring. There'll be plenty of IS-user development teams taking the field as well. Cross-functional project teams have received their share of publicity, but what about the individual players in these lineups? Each has a role that must be defined at the outset, or the team will be heading to the showers early, experts warn. Here's a sample lineup card suggested by Robert Binder, president of Robert Binder Systems Consulting Inc. in Chicago, and Edward Yourdon, a New York-based consultant and author of the book *Decline & Fall of the American Programmer*.

- ▶ **Line Manager:** Leadoff player, usually puts the first pitch in play.
- ▶ **IS Project Manager:** Another spark plug, can still start a rally if line manager falters
- ▶ **Resource Scavenger:** A fast runner, finds what it takes to win
- ▶ **Diplomat:** Cleanup hitter, rights wrongs and resolves disputes
- ▶ **User Computer Jock:** A savvy slugger, catches on fast
- ▶ **IS Worker Bee:** A solid technical hitter
- ▶ **User Worker Bee:** A designated hitter from the business side
- ▶ **Executive Patron:** The ultimate pinch hitter, comes through in the tight spots

reception when she was relocated to Unisys's materials business group. "Initially the users weren't so open toward us foreign people being there," Nakano said. She faults user management for not adequately preparing users for the suddenness of the move. But relations soon warmed when users realized the greater access they had gained to the programmers' development expertise.

Developers at Unisys, however, had lost something by being dispersed: the social camaraderie and immediate on-hand technical advice unique to centralized IS shops. Now if she has a technical question, Nakano must locate and call the resident IS experts in whatever user departments are their current assignments. With programmer interaction now primarily work-related, Nakano

also feels an awkward isolation from her peers. "It's like we all work in other departments; you're not an IS team anymore."

IS-user teams are probably the most common alternative work structure affecting software developers today. While some consider the team as a strategy to advance change, team building itself requires many changes, particularly in attitudes. It's hard for professionals once praised for their individual performance to become just one of many contributors to a common goal. Further, many programmers must overcome introverted natures to succeed in teams. When CIGNA RE, a division of Philadel-

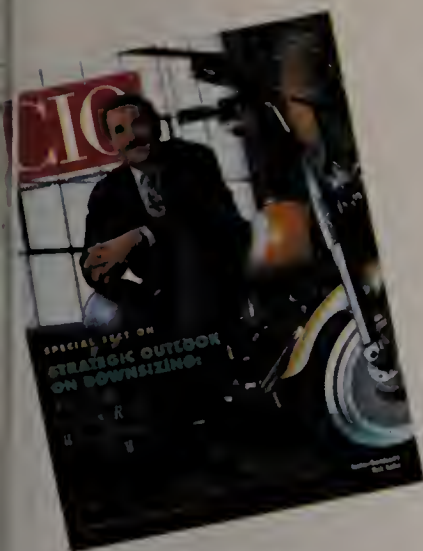
"After seeing what we accomplished, how easy and fast programming for client/server is, lots of programmers wanted to get in on this."

—Jim Busch

phia-based CIGNA Insurance Corp., created reengineering teams, veteran developer Florence Chapman was ill at ease. "I'm more of a quiet type than some of the others on the team," she acknowledged. But team practices helped encourage even the shyest to participate. "We made it a point to ask everyone's opinions and come up with a consensus, so you had to be involved," Chapman said.

Even after programmers have embraced new technology, adapted to new work structures and stretched to bridge the user-IS chasm, there is still one thing that can derail the whole change process: failure to update performance-evaluation criteria. Though they are now charged with learning new skills and forming long-term user partnerships, programmers are often still judged on their speed and code productivity, said L. Paul Ouellette, CEO of Ouellette & Associates Consulting Inc. in Bedford, N.H.

At Virginia Power in Glen Allen, Va., Senior Programmer Analyst Jeff Alexander gave up his mainframe duties to test the client/server waters with Powersoft's PowerBuilder and KnowledgeWare Inc.'s CASE tools. Evaluating these leading-edge skills presents a challenge for managers who hail



The basic one-year subscription rate for CIO magazine is \$94.

Subscribe And Save.

~~\$94*~~ **\$59**

Yes, enter my one-year subscription to *CIO* magazine and bill me later for only \$59, a savings of over 37% off the basic rate.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

**This is a domestic rate only (Canada & US). The foreign rate is \$175 US.*

JJ93

**PROCESS
IMMEDIATELY**



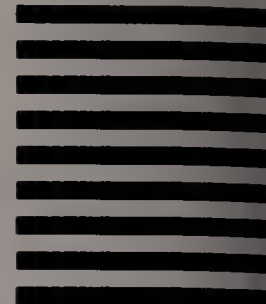
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

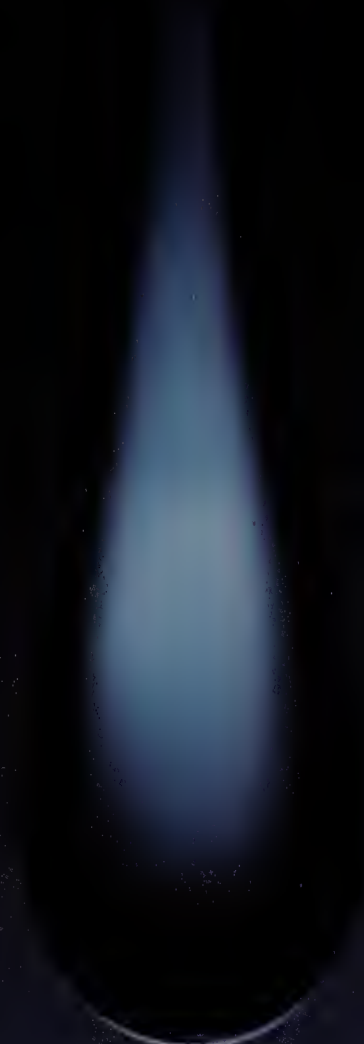
BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 1020 FRAMINGHAM, MA

POSTAGE WILL BE PAID BY ADDRESSEE

CIO Magazine
Attn: Circulation Department
P.O. Box 9208
Framingham, MA 01701-9900





There's evidence your
broadband needs are becoming much
more than a drop in the bucket.

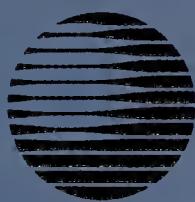
Are You



Ready?

Your company is facing a flood of data. And your people are demanding bigger, faster and more diverse services. Like E-mail, videoconferencing, LAN interconnection and high-speed data transmission. This means your network is growing in size and complexity. That's why you should call on your local phone company. Your phone company is backed by the products and services of AT&T and AT&T Bell Laboratories. That makes it easier for them to give you the quality and reliability you need. So it'll be easier for you to get your service up. To get all your people hooked up. And to keep your network up. Plus, your phone company can provide all the bandwidth you demand, on demand. So call your local phone company. And see how easy it is to handle your data when you're wired into the right people.

*AT&T And Your Local Phone Company.
Technologies For The Real World.*



AT&T
Network Systems

We're Ready For You

Right now, AT&T Network Systems and your local phone company are ready to provide you with the most advanced, reliable and cost-efficient service. Whether it's E-mail and high-speed fax for today or videoconferencing and personal communications systems for tomorrow. That's because your local phone company, using AT&T product and services, has everything you need. Equipment that won't become obsolete with the next wave of technology. The resources, experience and expertise of AT&T Bell Laboratories. And a comprehensive sales and support team. To learn more, call your local phone company. Because the more your needs grow, the more you need to be ready.

*AT&T And Your Local Phone Company.
Technologies For The Real World.*





The basic one-year subscription rate for CIO magazine is \$94.

Subscribe And Save.

~~\$94*~~ **\$59**

Yes, enter my one-year subscription to *CIO* magazine and bill me later for only \$59, a savings of over 37% off the basic rate.

Name

Title

Company

Address

City State Zip

**This is a domestic rate only (Canada & US). The foreign rate is \$175 US.*

JJ93

**PROCESS
IMMEDIATELY**



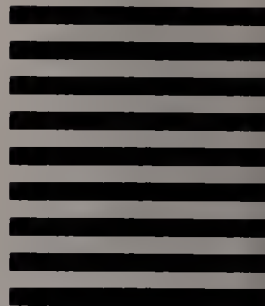
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 1020 FRAMINGHAM, MA

POSTAGE WILL BE PAID BY ADDRESSEE

CIO Magazine
Attn: Circulation Department
P.O. Box 9208
Framingham, MA 01701-9900



Supporting the Players

.....
Most software developers are at least willing to get with the new program, but they can't do it alone

- ▶ Sweeten the allure of new technology by granting programmers more flexibility.
- ▶ Stress the perks of working on high-visibility projects.
- ▶ Provide extra time for programmers to learn about tools.
- ▶ Ease deadline pressures so developers can become more thoroughly grounded in new technology or programming practices.
- ▶ Relocate developers to the user's environment, either temporarily or permanently, so they can study users' day-to-day duties.
- ▶ Incorporate new performance criteria into the employee-evaluation process.
- ▶ Use both user- and IS-management input on evaluations.

from the old mainframe school, Alexander said. "How can they judge you if they haven't made the transition themselves, and they aren't familiar with the things you're working with?" Alexander's boss had "an admitted learning curve" at first, but is now up to speed.

Home Insurance tried to solve the problem by incorporating new performance criteria into its employee-evaluation process. Knight's IS manager changed his review criteria to reflect programmers' increased interaction with users and their management of consultants on the project team. Knight believes his two recent promotions are due in part to these new performance criteria.

These organizational changes mean that programmer performance is no longer subject to review exclusively by IS managers.

The line managers now get their two cents in as well. And while having to please more than one boss may be daunting, for some programmers it's provided an unexpected boost. "To make sure the teams were sharing common goals and performance criteria, we had both the IS and the business-function managers jointly develop and complete the annual reviews," said Unisys's Leto. Surprisingly, the average programmer performance rating subsequently rose, bolstered by great reviews from the business-side managers. "By placing analysts out in the business community, their visibility increased and their value became better recognized" by users, Leto concluded.

But Unisys's dual evaluations were not without problems. IS Analyst Nakano not-

For many programmers, the chance to work with state-of-the-art software and systems is more than enough incentive to leave the mainframe rut behind and embrace downsizing.

ed that lack of communication between IS and line managers created confusion initially. "There was some initial hesitation in who we worked for and reported to," Nakano said. In addition, "IS managers were losing touch with what we were doing day-to-day. There wasn't enough ongoing communication between the two managers." Things are better, now that the leaders meet at least once or twice a month to catch up on developers' doings.

Dual user-IS management did not turn out as well for Mortgage Guaranty Insurance's multidisciplinary client/server work team. "We started out with two managers—one business and one IS," Dreher said. "Things weren't moving as well, so to streamline the process, they brought us under an IS manager."

Certainly for Dreher, Nakano and their peers, there was some trauma in leaving the safety of their familiar ivory tower environs. Yet they wisely accepted the inevitability of change, and see in it the door to greater opportunity. "Yes, it can make you apprehensive at first," CIGNA's Chapman agreed. But now she feels more in tune with the users she supports throughout the organization. "It's made a positive difference in how I feel about the division itself and my place in it." ☐

USER CONTRIBUTIONS

The Reluctant Ally

BY MEGHAN O'LEARY

I*t was easy to lend the IS guys a handful of customer-service reps last time they needed to test a new system—four people, two days, no problem—but now they're asking for my second in command to be on a development team for six months. With this economy, I can't afford to replace anyone. And they want me to talk to them about strategic direction. Do they even know what that is? Is this really worth it? If it fails, it's my head. I guess that's reason enough to have my people in there. I can't imagine letting the IS group develop our new system without us overseeing it."*

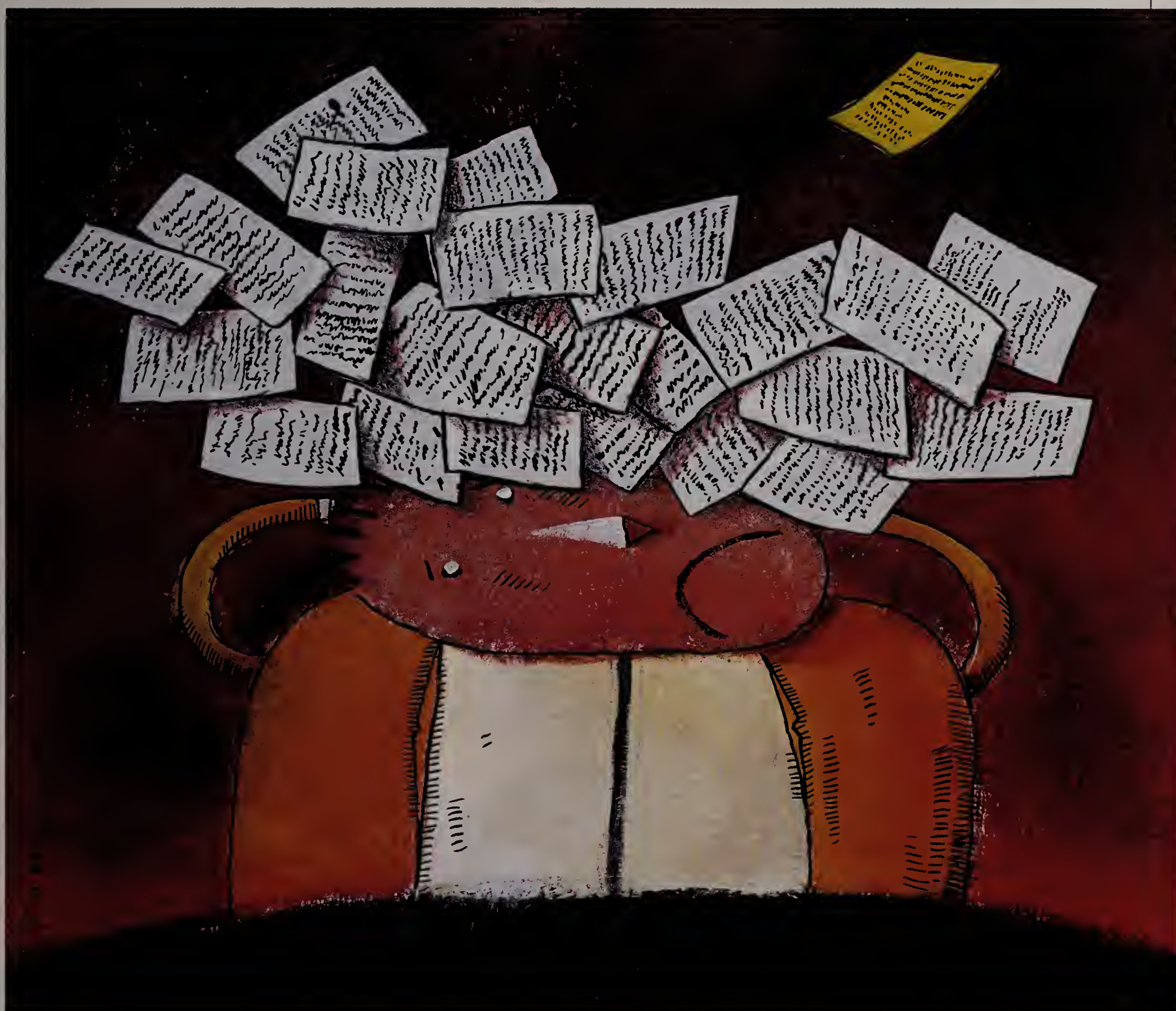
This might not be the most familiar sound in the world to many IS executives: a departmental manager—a user—talking about "our" system. But ownership of software development is on the rise among users, who realize, or at least are being told by their bosses, that they are responsible for using technology effectively in their businesses. And as uncomfortable and confusing as it might be to work in new ways with technical people outside of one's department—and on software of all things—the fact is, users must have a hand in making sure that the system they require really meets their needs.

The biggest challenges for many line managers right now are to involve their users without wasting their time, and to foster

the communication between users and IS people that will result in a robust system.

The best method line managers have found to effect the martini-like mingling (shaken, not stirred) of IS and users is teamwork. Teams are everywhere—the product of Total Quality initiatives, business-reengineering efforts and new systems-development methodologies. They may be visionary steering committees, strategic management boards or hands-on development and implementation groups. They may be made up of division vice presidents, line managers or customer-service reps, or they may be a mix of all levels. They may be limited to one department or cross many departments, depending on their specific function and the system being developed. Whatever their makeup, teams are the one unifying theme among companies trying to get users involved in software development.

At their most advanced, teams work to define system requirements, break functions down into processes that can be automated, and create a vision of a system. Such is the case at Georgia Gulf Corp. in Atlanta and at International Paper Co. in



Memphis, Tenn. At organizations such as the University of Michigan Medical Center in Ann Arbor and the Florida Department of Transportation in Tallahassee, teams of users periodically meet with the IS project team to test and offer feedback on system prototypes.

One obvious benefit of having users on teams is that they can identify the relationships between, and the needs of, many business disciplines and foster development of systems with a business rather than a technology focus. Teams made up of business professionals have found networking to be an effective systems-development tool. Rasjad Lints, a resident in pediatrics at Michigan's Medical Center, and a team of his fellow physicians contacted medical peers throughout the country to discuss the patient-information systems they were using.

Not only did they learn how the systems performed in real, live work environments, they also discovered some unpleasant realities of building complex systems—in one case, that a system had taken two years to install rather than the six months the vendor had promised. That information allowed the team to look at the vendors they were considering with new eyes. Another hospital told them of having errantly switched to a new system too abruptly, without giving users time to learn it and get comfortable with it.

Successful teamwork depends on putting the right people from the right levels of management and staff on the right teams. Although senior managers might be happy to play with a new system, they're not the ones who will be using it and there-

End users must be involved in systems development in order to make sure they get the systems they need.

ILLUSTRATION BY JAMES YANG

Iterative systems development based on prototyping is an effective way to stay aligned with user needs and to get critical feedback at different stages in the development process.

fore shouldn't be on the prototyping team, pointed out Dr. William F. Bria, medical director of the Critical Care Medical Unit and of Clinical Information Systems at the University of Michigan. Similarly, while a departmental power user with a burning desire to move a system through to completion might be helpful on an implementation or prototyping team, he or she probably wouldn't have the clout required for the steering committee.

Building Better Teams

.....

Finding the right users to help develop systems—and winning their cooperation—is no small task

Like it or not, systems development today usually requires user participation. Teams that combine users and IS staff are working to define critical work processes and devise the systems that will carry the business into the future. Unfortunately, such teams rarely spring wholly formed from the head of the CIO. But there are some ways to make sure all the work is worth the effort.

- ▶ Put the right people from the right levels of management and staff on the right teams.
- ▶ Develop team-member profiles and recruit to fill the positions.
- ▶ Move development teams away from the office. They will be more likely to focus on the task at hand, make decisions without checking with managers and solve problems quickly.
- ▶ Use iterative systems development to stay aligned with user needs and get critical feedback at different stages in the development process.
- ▶ Pull users into the development process by broadening their job descriptions to include it.
- ▶ Assign a certain prestige to participation in development projects.
- ▶ Train IS staff to interview users so they will better understand their needs.
- ▶ Assign IS advocates to user departments.

Generally speaking, executive managers function as champions or visionaries and have an oversight role in software-development projects. Their support is critical, as is their input with regard to the company's strategic plan. "I bring the ability to make sure that whatever comes out is in keeping with our overall direction," said Tom Barry, assistant secretary of finance and administration for the Florida DOT. That agency is developing a project-scheduling tool for statewide use that is based on Texas Instruments' IEF CASE tool and James Martin's systems-development methodology.

Other companies have found that managers and nonmanagers are a winning combination, bringing to a project an understanding of both the whole business and the realities of work in the trenches. At Georgia Gulf, which has been developing a customer order-processing system and moving to a client/server environment, a design-review committee includes the most talented and computer-oriented employees from each functional area, according to Director of Information Services Roland G. Volk. As a result, a staff member from billing and the corporate credit manager are working elbow-to-elbow to develop the customer-service system.

According to project managers, it takes a certain kind of user to work on a team: "the ones who complain the most," joked Arne Hook, manager of customer service and transportation, and a project-team leader, for Georgia Gulf. Hook was only half joking, however. People who are critical of the system often have ideas about how to make it better, he said. Hook also looks for employees who have expressed a desire to be part of a development project and those who seem particularly creative and innovative.

Teams often seek out the most influential and change-oriented users as members. At the Florida DOT, Barry and his steering committee used to identify a person in each regional office and draft that person for the systems-development team. They found, however, that managers weren't very supportive of an approach that skimmed their best employees. So Barry developed user-team-member profiles and recruited to fill the positions. A profile might list leadership or interactive skills as important criteria. One specified that the person had to have a sense of humor. Barry still requests specific people for teams, but he offers the

Computron Seminars 1993
Business Process Reengineering

*It's Later Than You Think,
But Easier Than You Were Told*

Live Television Broadcast, April 1, 1993

For More Information Send In Card or Call:

Name _____

Title _____

Organization _____

Address _____

City _____ State _____ Zip _____

Phone _____

CALL
1-800-289-0074

computron



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

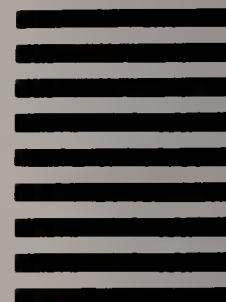
BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 4 RUTHERFORD, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

computron

Meadows Office Complex
301 Route 17 North
Rutherford, New Jersey 07070-9860





Reengineering, Client/Server, and Imaging/Workflow

*...Client/Server and Imaging/Workflow
are cardinal technologies of the 90s,
making reengineering and its
powerful ROI possible.*

*And reengineering is what many
of you may be doing right now, whether
you're formally redesigning the business
process enterprise-wide, or simply selecting
an accounting module, downsizing a
DP operation, fine-tuning a function, or
setting up a new business unit...*

For More Information
800-289-0074

© 1993 Computron Technologies Corporation

Business Process Reengineering:

*It's Later Than You Think,
But Easier Than You Were Told.*

Live Television Broadcast April 1st

In our nationwide seminar series we've been showing people how they can avoid the mistakes which others have made in business process reengineering efforts — and how they can get started faster, and ensure the success of their projects at a price far less than they ever expected.

However, due to overwhelming demand, we've had to turn people away. So now we're making these inside secrets available to everyone — in a live, interactive television broadcast on April 1st.

Highlights of this program will include:

Thornton May of Tenex Consulting — one of the leading figures in reengineering today — who will tell you what strategies made over 600 projects he was involved with successful...or doomed them to failure.

A special taped interview with **Tony Percy of the Gartner Group** who will discuss client/server and open systems architectures, and the important roles they play in any reengineering project!

A video tour of a recently completed reengineering project in the accounts payable department of a \$2 billion distributor.

This broadcast will be the Number 1 educational event for reengineering in 1993. If you are involved in reengineering this year you can't afford to miss it! **Call today for more information on how to participate in this important, no-cost event.**

Presented by:

computron

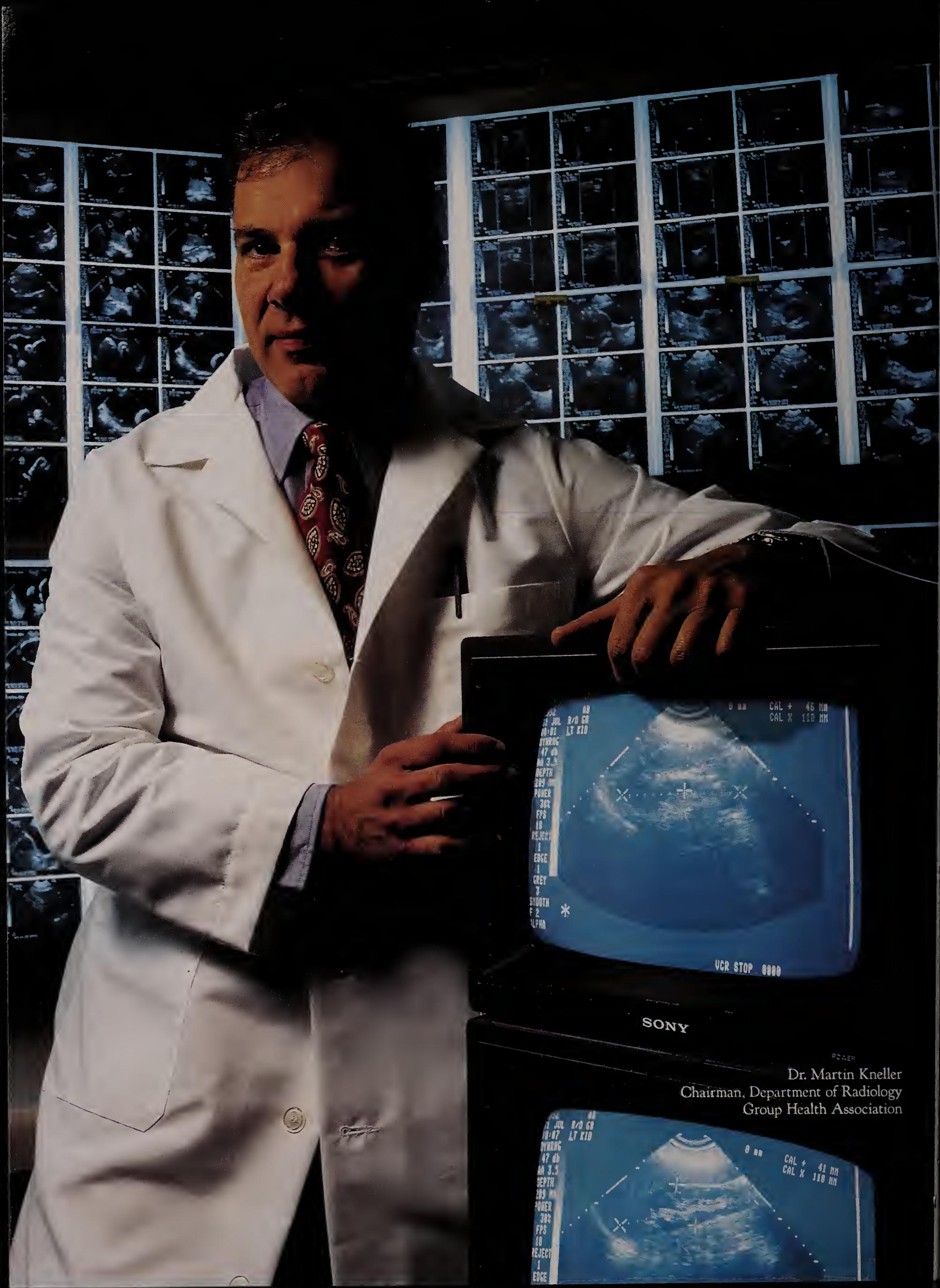


With Corporate Hosts:

COMPUTERWORLD



**HEWLETT
PACKARD**



Dr. Martin Kneller
Chairman, Department of Radiology
Group Health Association

“Looking for a specialist in data systems and solutions?”

We're Group Health Association,
the first HMO in the Washington, D.C.,
Metro Area. We provide comprehensive
medical care for a fixed premium. This
means managing expensive procedures,
without sacrificing quality care. Ultra-
sound exams, for
example, are
costly and time-
consuming, but

Call me.

vital. We knew what we needed—to let
radiologists at our main facility view
ultrasound exams as they happen at our
remote clinics. That way we could pro-
vide our patients with direct, immediate
access to physicians, speeding up formal
diagnosis and treatment. And, we could

make more efficient use of our radiolo-
gists. So, we called on the companies of
Bell Atlantic.*

Bell Atlantic designed and installed a
dedicated fiber optic network that enabled
our ultrasound equipment to send “live”

full motion
video images to
be viewed on
high-resolution

monitors by physicians at our main facility.
Connecting locations saves us more than
\$750,000 a year. More importantly, we're
providing better patient care.

Give me a call. I'll tell you more
about our healthy relationship with
Bell Atlantic.

I'll refer you to Bell Atlantic.”

1-800-759-6463, ext. 1006

©Bell Atlantic
We're More Than Just Talk.®

Callers will hear a recorded message from Dr. Kneller, and will be given the opportunity to leave a message for him or speak with a Bell Atlantic representative. *The Bell Atlantic family of companies includes Bell Atlantic Healthcare Systems, New Jersey Bell, Bell of Pennsylvania, Diamond State Telephone, the C&P Telephone Companies and other communications and information management companies. © 1992 Bell Atlantic

profile if a manager says a particular person can't be spared. In some cases, managers have provided two people, each for a short period of time, to fill one position.

Once a team is in place, it often struggles to find the time to devote to systems development amid the distractions of regular work. At International Paper, Director of Application Development Ron Grohowski puts teams in a large room at a com-

One way to pull users into the development process is to broaden their job descriptions to include it.

pany facility for application development six miles away from headquarters. Not only do these teams tend to get more done, but the environment seems to make members more assertive, according to Grohowski. They are more likely to make decisions without checking with managers, and they solve problems quickly.

Development teams at International Paper include representatives from financial systems, application-development staff, mill-operations people and managers representing the business-group controllers who oversee the company's 23 mills. According to Keith Mull, who manages one of the teams and is International Paper's supervisor of financial systems, the off-site development teams have the luxury of being able to devote themselves to a single priority and thus get their work done quickly and effectively.

Even teams with end-user members can become isolated, however, and they must ascertain that the decisions they make about systems development reflect the needs of users at large.

Many development teams have found iterative systems development based on prototyping to be an effective way to stay aligned with user needs and to get critical feedback at different stages in the development process. By allowing users to test applications and interfaces as they are being built, developers can make necessary changes along the way (and alter their course when necessary) before presenting the finished product.

Prototyping is also a means of involving

large numbers of users in development without requiring major time commitments from them. The University of Michigan's Bria believes that prototyping helps users figure out what they want from systems by letting them try out various types of applications and interfaces. At The Forethought Group Inc., of Evansville, Ind., which provides funding for prearranged funerals, prototypes of claims-processing and report-generating applications allow users unfamiliar with technology to know what they need by giving them an example of what they could have.

At Baystate Health Care in Boston, where Bria formerly worked, the design of a patient-information system went very slowly when Bria asked clinicians to describe what they wanted. "They stared at me and nothing happened."

But when Bria went out and got examples of systems from other hospitals and let the users try them out, "they started to make choices at light-speed, and we moved forward incredibly quickly."

For users whose input is critical but who may not have time to serve on a team, prototyping offers a quick path to generating support for a system. For example, use of prototypes allowed Georgia Gulf's national sales manager and business-unit vice presidents to OK screens of preliminary systems and support the project without devoting a lot of time to it.

As users become more deeply involved in software development, they and their managers must balance their participation against their regular workload. The reality, especially in an organization dealing with downsizing, hiring freezes or efficiency initiatives, is that it hurts to lose an employee to a six-month development project; the rest of the department has to pick up the slack.

Faced with this sacrifice, users and managers both want IS to make it worth their while to get involved. Tobey Choate, vice president of information technology consulting for Arthur D. Little in Cambridge, Mass., believes that the only way to pull users into the development process is to broaden their job descriptions to include it. Rather than altering current jobs, some companies have made systems development a new career opportunity.

At Milwaukee-based Mortgage Guaranty Insurance Corp., two underwriting analysts were given the newly created job of as-



IS FINDING WHAT YOU NEED TAKING MORE TIME THAN YOU HAVE?

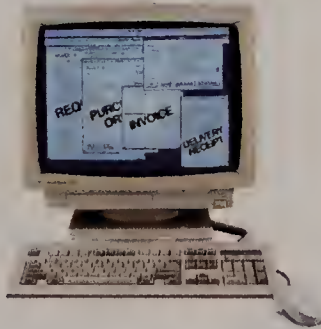
Your search is finally over.

Introducing MI³MS[®] 3000. Minolta's revolutionary new Image management system. It accepts input from paper, microform, FAX and text files directly so you can collect, organize and use all of your document-based information simply and effectively.

It's easy to use, yet powerful enough to link your data to its original source. What's more, MI³MS 3000 operates under Microsoft[®] Windows[™] and will work with your other DOS and Windows programs, giving you local access to centralized data and images.

There's even an application generator that allows you to tailor the system to your needs. MI³MS 3000 gives you unprecedented power to make your whole business more organized, more streamlined, more efficient. In a word, more competitive.

To find out more,
call 1-800-9-MINOLTA.
The sooner, the better.



DOCUMENT IMAGING SOLUTIONS
ONLY FROM THE MIND OF MINOLTA



MINOLTA

MI³MS is a registered trademark of Minolta Camera Co., Ltd. Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.

sistant project manager so they could help develop an automated mortgage-underwriting system that required their expertise. "In our prior jobs, we were pretty much locked in and had reached a plateau," said Dan Knight, one of the analysts who were made

Regardless of the arguments or incentives IS offers, the long-term commitment of departmental managers to a better way of working and users' enthusiasm for potentially more interesting work are what will ultimately bring them into the development process.

assistant project managers. "From here we could go on to management opportunities."

The Florida DOT's Barry emphasizes the benefits of technology and cross-functional training when he is trying to involve managers or users in development. Team members return to their regular jobs proficient in the new system and with a better understanding of how the organization operates as a whole, he says. The resulting system operates more efficiently and effectively, and workers are more productive and better informed.

Barry's argument succeeds because managers and users believe that the long-term gain is worth the short-term sacrifice. But, Barry said, "if we stop getting volunteers, we might have to resort to the begging-and-pleading methodology."

When persuasion fails, there is always the appeal to status. At the Florida DOT, Georgia Gulf and International Paper, involvement in a development project carries with it a certain prestige, which has given rise to competition among nonmanagerial users to be involved.

Companies with successful team-development strategies know that effective communication among business and IS people is essential. They find that team members start to speak the same language after long collaboration. For this reason, departments at The Forethought Group work with the same group of developers again and again.

Georgia Gulf IS staff have received for-

mal "consultant" training in interviewing users and understanding their needs. The IS department has also designated advocates for each plant and office site. These IS employees travel to the sites frequently in order to get to know their customers and the business.

While many users of IS services agree that communication with IS is not what it could be, they attribute the failures to ignorance rather than long-standing hostility. Joe McLeod, a project manager for the Florida DOT, is impatient with the suggestion that IS groups are merely obtuse when it comes to understanding user needs. "It's totally impractical to expect the computer people to know everybody's business in the department as well as the people who have been doing the work for 20 years," he said. The reality is that you're going to get a much better product if the people using it are deeply involved in its development.

Users admit that they ultimately embrace systems development when they have no other choice. The Florida DOT and Georgia Gulf have so little leeway in terms of staffing that they need effective software systems to survive. They can't waste time or money on a bad system, so they have to be involved. At the University of Michigan, physicians know that their involvement in developing a patient-information system ensures that they will get what they want.

Regardless of the arguments or incentives IS offers, the long-term commitment of departmental managers to a better way of working and users' enthusiasm for potentially more interesting work are what will ultimately bring them into the development process. Georgia Gulf's Volk believes that organizational culture goes a long way toward determining the extent and the spirit of user involvement. Volk claims that the company, which was the object of a leveraged buyout in 1985 and has since run lean, has among the highest sales and profits per employee in the Fortune 500, and he attributes this to a culture where people are encouraged and expected to wear multiple hats.

"It's fairly common to have people involved on task forces and teams and have a sense of commitment in addition to doing their regular jobs," he said. At an organization as lean as Georgia Gulf, he admitted, people may not have the time, but they always make the effort. ☐

Client/server:



Ready when you are.

When you're searching for solutions to business-critical problems, you can feel every second slip away. That's why it's time you learned that SAP has the client/server solution you need. And it's ready today, not someday. In fact, the R/3 System is already hard at work in businesses around the world.

Like our proven R/2 mainframe software, client/server-based R/3 is a fully integrated package. Its applications manage manufacturing, financial, sales, and human resources functions across your enterprise. And across hardware platforms from BULL, DEC, Hewlett-Packard, IBM, and Siemens-Nixdorf.

So when you're ready to start taking advantage of client/server computing, or if you want to learn about our full range of software solutions, call SAP at 1-800-USA-1SAP. But do it today. Before any more time slips away.

See us at UniForum

San Francisco, CA Booth #5015

©1992 SAP America, Inc.

SAP
Integrated software. Worldwide.™



PROFILE

Perdue's New Pecking Orders

Springing back from a failed decentralization attempt, this poultry powerhouse discovered that sometimes it takes a tender management style to make a tough IS department

BY MEGAN SANTOSUS

It shouldn't take long for a visitor to Perdue Farms Inc. to realize that Bob Cook appreciates the people who work for him. Clues are everywhere throughout the company's non-descript headquarters in Salisbury, Md. If the customer-satisfaction scores posted on the walls escape notice, the numerous "Associate of the Month" certificates are easy to spot.

Then there's the smell of pizza—members of Cook's staff are being feted for another job well done.

"Having satisfied associates is the key to delivering quality products and having satisfied customers," said Director of MIS Cook. As evidence, he points to the successes racked up by his systems-development staff since IS began emphasizing communication and employee development. Since 1989, the average time spent on maintenance (dubbed "fix it" in Perdue's no-frills parlance), has been shaved from 146 to 52 hours per week. Today, associates spend 94 percent of billable hours building new systems or improving the existing ones

deemed most valuable to the business. As a result, a six-year project backlog has been eliminated. The average program-development or "build-it" time has plummeted from 60 hours per week to 16, while the average build-it cost per program has dropped from \$1,950 to \$568. These impressive figures add up to a 300 percent increase in associate productivity and an enviable systems-development ROI of three dollars of benefit for each dollar invested, according to the company's calculations.

The emphasis on IS employee recognition and training is a recent development at Perdue. The private, family-owned organization hatched onto the scene in 1920



BOB COOK: *Perdue's approach to information systems is considerably less than cutting edge. "We're interested in proven technologies. Being a generation behind is acceptable."*

PROFILE

GEORGE REISWIG: *"We were an industry leader in terms of marketing, sales and logistics. We wanted to create an MIS department which would be consistent with our corporate objectives and culture."*

as a modest 23-hen egg operation and evolved into the fourth-largest integrated poultry company in the United States. In 1988, the company responded to a disastrous decentralization effort by reorganizing the data center and rethinking its attitude toward both associates and end users.

The new management approach emphasizes communicating goals up front and publicizing results after the fact. In addition, the time spent on associate development and training has increased from less than one week per year to five. As a result of these changes, Perdue has slashed its IS turnover rate to 8 percent, down from 30

percent in 1988, according to Cook.

Such management and process changes have contributed more to the department's accomplishments than new technology, although technology has certainly played a part. Cook describes Perdue's approach to information systems as considerably less than cutting edge. "We're interested in proven technologies," he said. "Being a generation behind is acceptable."

IS has certainly come a long way since 1988. That was the first year Perdue found itself operating at a loss, caused in part by the decentralization begun in the



PHOTO BY KATHERINE LAMBERT



MILTON SHUPE: *"We have to recognize the areas with the need and the high-payback potential for our services."*

Automation is never the first step in a project. Rather, it occurs only after superfluous business processes are eliminated, and necessary ones simplified.

early '80s. At that time, one data center was spun off into three separate centers in an effort to push decisions down through the corporate ranks and provide more autonomy. But when the strategy that was supposed to control costs actually drove them up instead, company executives responded quickly by reconsolidating and downsizing.

The transformation in IS was initiated by George Reiswig, now Perdue's vice president of finance and CFO. Reiswig is an unusual bird: a CFO who used to be an IS director. Until two years ago he held Cook's position; now Cook reports to Reiswig, and an unusually supportive relationship exists between traditional rivals.

Reiswig's imperative was to streamline the organization in order to provide cost-effective business solutions. Along the way, IS associates had to become internal consultants, well versed in the intricacies of an industry characterized by low margins and stiff competition.

"We needed to focus on basic things, like reacting quickly to business changes and meeting on-time delivery," said Reiswig. "We

were an industry leader in terms of marketing, sales and logistics. We wanted to create an MIS department which would be consistent with our corporate objectives and culture."

Developer-user partnerships, popular among end users at one of the data centers, survived the era of decentralization and precipitated a departmentwide culture shift. Charged with the mission of meeting or exceeding systems requirements, IS had to rethink its entire attitude toward end users.

"We started to look at them as customers who have the right to shop with us or not," Cook said. IS had to ensure that its services were valuable and relevant to the business units. For their part, customers had to understand that they had a vested interest in development projects from the start.

Toward those ends, a monthly chargeback system was implemented in 1988, and a formalized mission statement and list of critical success factors (CSFs) were incorporated into the systems-development methodology. One major tenet of the methodology is that automation is never the first

step in a project. Rather, it occurs only after superfluous business processes are eliminated, and necessary ones simplified. "The departments have a fixed [number] of hours per month," Reiswig said. "They define their own priorities, which is necessary if they're going to buy in as customers."

The CSFs for each project include senior-management sponsorship; limited proj-

ect size, duration and scope; precise definition of requirements; and continuous involvement of both the systems staff and the customer. Planning is a collaborative process between systems staff and customers, and each project's requirements are stated up front in customer/supplier agreements.

Educating IS associates in the operations of different departments is essential, as is maintaining partnerships with internal customers. With these goals in mind, the systems-development team is divided into five groups, each aligned with a specific functional area: sales and marketing, finance and human resources, logistics, quality assurance, and fresh-poultry and plant systems. Each group of six developers is managed by an applications-development manager (ADM) with at least 15 years of experience. The data center, which is responsible for telecommunications, operations and technical services, is also organized into teams. Like any organization committed to service, IS spends a lot of time identifying its customers, finding out what they do and figuring out how technology can help them.

"We have to recognize the areas of the business that really have the need and the high-payback potential for our services," said ADM Milton Shupe. "The 44,000 billable hours we have available must be targeted to those projects that bring the most value to the company."

The bulk of the IS department's hours are allotted to sales and marketing. "The future rests in providing services our competitors can't provide," said Roger Covey, vice president of sales. "There's only so much you can do with chicken, so our service will set us apart."

Service is a complex process in the integrated poultry business because companies control all phases of production, from the time an egg is laid to the delivery of packaged products to supermarkets. For example, when an order is placed, chances are the product is still alive and clucking. That's great in terms of freshness, but it adds an interesting dimension to the traditional concept of inventory. In addition, all of Perdue's orders are customized, beginning with negotiated prices. And because the company refuses to freeze its poultry, time is critical: Perdue's drivers aim to arrive within 30 minutes of their scheduled delivery time.

To address some of these issues, IS de-

Down on the Farm

Perdue's ambitious apprenticeship program helps overcome the drawbacks of its out-of-the-way location

Finding skilled IS employees is hard enough for most organizations these days. Situated amid the bucolic soybean fields of Maryland's Eastern Shore, Perdue Farms Inc. has the additional burden of trying to find good systems professionals who are willing to work off the beaten path.

"In terms of our location, we recognize that we have trouble enticing people to work for us," said Jackie Barnes, director of quality improvement process. Landing qualified college graduates is a particular challenge because of Perdue's selective hiring profile, which requires candidates to have a minimum 3.5 grade point average.

To combat its geographic handicap, Perdue has developed a rigorous apprenticeship program that serves the dual purposes of recruiting new hires and weeding out those who are unsuited for the company's team-oriented IS culture.

During the six-week program, apprentices spend time in the data center, systems development and production plants. After each phase, they are required to write a paper and make an oral presentation to senior managers demonstrating a working knowledge of Perdue's business goals and specific IS functions.

Each apprentice is assigned to an adviser, who provides feedback and helps the apprentice prepare papers and presentations. A "buddy" takes the recruits on a tour of the Salisbury area, introduces other members of the IS staff and provides instruction in routine office procedures.

While apprentices are given a hands-on rundown of tools and technologies, plenty of time is devoted to mainstream business skills such as communication, team management, customer satisfaction and production operations.

Linda Roskovich, a programmer/analyst who has been an apprentice as well as an adviser, called the program "a wonderful orientation. I've worked at other companies where it's just sink or swim, but Perdue is willing to invest time in training."

—M. Santosus

BUSINESS

INTERNATIONAL COMPETITION INTENSIFYING

One by one, world trade barriers are falling, leading to the rise of a truly global marketplace.

Aided by the substantial breakthroughs in telecommunications and computer technology, many firms are finding it easier than ever to enter markets around the world that were previously unreachable.

Even the smallest firms are now able to compete on a global basis, and are finding that overseas markets offer greater growth potential than domestic markets, which may be flat or saturated.

However, this advent of increased global competition has had a brutal impact on price margins.

Local firms which had previously been protected by tariffs or government subsidies are now finding themselves pressured to compete with the new wave of global competitors, whose economies of scale are offering products of quality at lower prices.

This new global marketplace has created the demand for multi-currency financial software that can consolidate a firm's global financial picture into one integrated balance sheet or P&L in seconds.

Due to very confusing, complex and ever-changing tax structures, foreign currency exchange rates that vary country-by-country—this presents a new challenge to the new breed of CFOs. ■

PRESSURE HEATS UP ON FINANCIAL FORECASTING

The ability to accurately forecast both financial trends in the marketplace as well as the financial performance of the firm is becoming critically important in today's fast-moving, highly competitive marketplace.

With the introduction of new multi-dimensional modeling and financial analysis software, the quality of financial forecasting has risen substantially over the past few years.

New spreadsheet technology such as CA-Compete!, which allows the creation of a multi-dimensional cube of data as

for
an
has
dec
fram
to ju

TIMES LIKE THESE CALL FOR THE FINANCIAL SOFTWARE OF THE FUTURE.

How else will you compete in a world that gets more competitive, more complicated and more technology-driven every day?

New CA-Masterpiece® 3.0 is designed for such a world. It's got EDI. GUI. Client-server. Multi-dimensional modeling. Multinational and multi-currency support. And the industry's broadest selection of high-performance modules and add-ons.

CA-Masterpiece 3.0 is a generation ahead of the financial software you're probably using today, and it covers all the hardware platforms you'll ever need: MVS, VSE, UNIX, VAX and AS/400. From mainframes to workstations to PCs.

Best of all, it's backed by CA, the world's leading software company, and software partner to 95% of the Fortune 500.

So dial 1-800 CALL CAI for a free Demo Disk of the financial software of the future.

There's never been a better time.

NEW CA-MASTERPIECE 3.0.

**COMPUTER
ASSOCIATES**
Software superior by design.

© Computer Associates International, Inc.,
One Computer Associates Plaza, Islandia, NY 11788-7000.
All product names referenced herein are trademarks
of their respective companies.

CA90s

Free
Demo Disk

powerful and
are wooing
from traditional
environments.

UNIX, AS/400,
and offer incredible
breakthroughs and
(graphical user inter-
faces).

These hardware platforms are
users await proven, mission-
are to run on these exciting
things.

DOWN-SIZING TRENDS ACCELERATES

What will be needed is a way to integrate innovative, new, cost-effective platforms and technology with clients' existing systems and investments.

One can afford to walk away from past investment and start over. Pouring hundreds of millions of dollars into IS systems for several decades, America is starting to demand a return on its investment. The Return On Investment (ROI) of IS is difficult to measure and impossible to project. But still, a meaningful way to assess it must be found.

One aspect of it that is easy to understand is the amount of money in existing IS systems.

Looking back and adding up the investment in systems, training, development, etc., it's easy to know how much a corporation will be abandoning its current systems.

For corporations who have under-estimated the exercise, it can be quite a painful experience. It also puts in a new light proposals to scrap existing systems. ■

INVESTMENT PROTECTION #1 PRIORITY

Many hardware and software vendors are proponents of "starting over" for various self-serving reasons, it is rarely a cost-efficient or rational move for clients. Instead, prudent clients focus on evolutionary technological advances, as opposed to revolutionary ones. There's no reason to throw away existing systems when there's always technology that integrate the old with the new.

PROFILE



ROGER COVEY: *"One of my goals is to continually improve the level of service without adding staff. IS explained step-by-step how automation can help us do things we otherwise wouldn't be able to do without adding people."*

veloped a customer-ordering system (COS) for the centralized sales office in 1989. The online, transactional COS runs on a LAN and encompasses 13 applications including order entry, product transfers, sales allocations, production scheduling and credit management. (An outage of four hours can cost \$2 million in lost sales, so there is a separate LAN for redundancy.) Orders are entered directly into the system and passed electronically to each of the functions. At the processing plants, products are automatically packaged, weighed and priced, saving time and money for retail customers.

IS is also working on a project to put machine-readable case labels on the cardboard boxes in which products are shipped. Scanning the labels will eliminate manual collection of product and price information and should reduce costs by 25 percent, according to Covey.

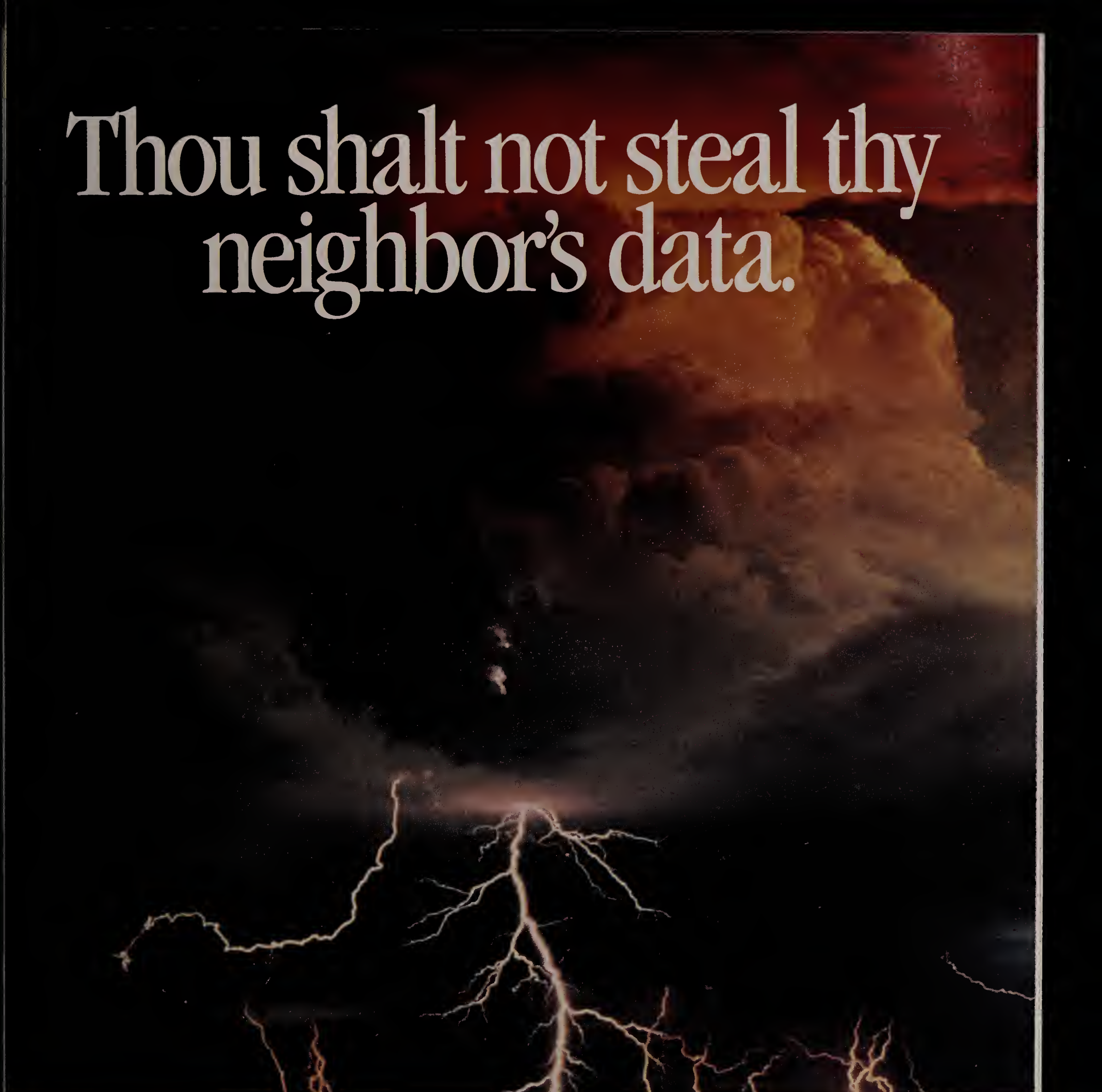
Covey was resistant at first to the part-

nership approach of IS. "We were reluctant to get involved with something beyond the scope of our knowledge," he said. Besides, in his 20 years at Perdue, he had seen sales increase from \$50 million to more than \$1 billion while the company was still using pencils and paper.

But Covey was won over by the IS department's efforts to ease any misgivings about technology. "One of my goals is to continually improve the level of service without adding staff," he said. "They explained step-by-step how automation can help us do things we [otherwise] wouldn't be able to do without adding people." When computers were introduced to the plants, IS stayed on hand until employees were comfortable using the technology.

Covey says he now considers IS to be a valuable business partner. "Bob has made his department an integral part of our team, our planning process and our day-to-day operations," he said. Recently, IS installed a

Thou shalt not steal thy neighbor's data.



Prevent unauthorized access to your network and protect your data with InterLock_{SM}.

Whether you have a private TCP/IP network or tie your network into the public Internet, you must safeguard your network and your data.

The InterLock_{SM} family of security services from ANS CO+RE Systems, Inc. keeps prying eyes off your confidential material by preventing both trespassing and unauthorized transmission.

InterLock_{SM} provides security between segments of a company's private TCP/IP network and sets up a barrier between the private network and the Internet. The InterLock_{SM} services include security-enhanced versions of TELNET, FTP, SMTP, NNTP and X Window SystemTM protocols, plus end-to-end data encryption.

Using password protection and controlled access to these services,

InterLock_{SM} prevents unauthorized users from accessing your network or removing proprietary information.

Data transmission through InterLock_{SM} applications is completely transparent. And you can choose from a variety of security control features.

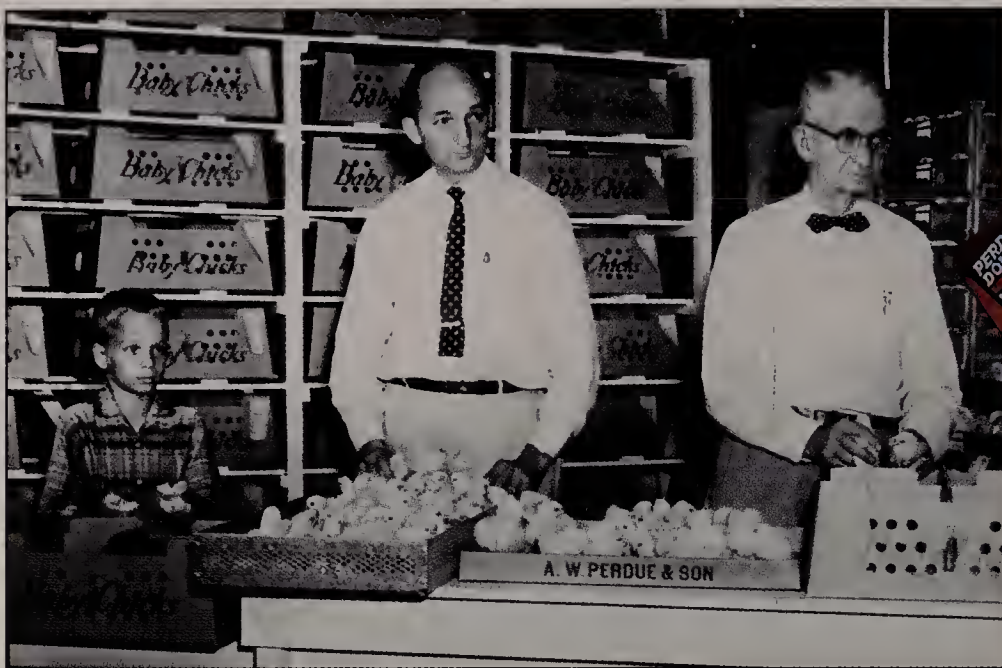
InterLock_{SM} is already protecting the proprietary information of some of the nation's leading companies. What are *you* doing to protect your network and your data?

For more information call 1-800-456-8267.

Or write: ANS CO+RE Systems, Inc.,
100 Clearbrook Road, Elmsford, NY 10523

ans
CO+RE Systems, Inc.

PROFILE



WHICH CAME FIRST? As far back as the 1950s, the Perdue-family dynasty was already in place. Arthur W. Perdue (right), who founded the company in 1920, was succeeded by his son Frank (center) now chairman of the executive committee. Frank's son James (left) became chairman in 1991.

presentation application that creates reports complete with charts, graphs and overheads in one hour, compared to the two days it used to take two people to do the job manually.

"MIS spent a lot of time in our area identifying needs," Covey said. "They performed a cost-justification and payback analysis and suggested a presentation system. We used to do just one presentation a year

for the top 20 percent of our customers. Now we can do them on a quarterly basis for practically all our customers." As for future projects, Covey will sign on to electronic data interchange whenever enough major supermarket chains express an interest.

IS has immersed itself in other departments as well. "I feel that [IS] knows as much about my job as I do," said Lori Layfield, a corporate human-resources representative. Last November, IS implemented a worker-safety program for the human-resources department and installed a host-based fixed-assets package on behalf of finance. And the treasury department was the recent recipient of a credit-management system that has improved productivity and reduced accounts-receivable carrying costs by \$48,000 per year.

Keeping customers informed about plans, goals and activities is another important part of IS managers' jobs. "We work closely with senior [line] managers," Cook said. "We issue monthly status reports which I look on as advertising." As a result, customers have a better understanding of the traditionally mystery-shrouded IS function. "I know what a programmer does, I know what computer systems we have, and I know what telecommunications does," said Layfield. "Knowing about MIS makes you have a buy-in to what they're doing."

Perdue's long-range, strategic-planning efforts present one of the IS organization's greatest challenges. "Historically, Perdue wasn't good at strategic planning," said Shupe, who led the company's first five-year strategic plan, which centered on logistics. As part of the effort to change and enlarge the IS role, Shupe and his fellow IS managers have undergone education in strategic planning. "We've always been great executors," Shupe said. "Now we're learning to become great planners." 

Technical Profile

Perdue Farms Inc., based in Salisbury, Md., is a \$1.3 billion integrated poultry producer with 12,500 employees located at 35 administration, production and distribution facilities. Perdue's market for chicken and turkey products extends from Maine to Atlanta and as far west as Chicago.

Perdue's mainframe-based applications are gradually being offloaded onto LAN-based workstations scattered throughout the company. Three percent of the company's computing base resides on workstations; that should increase to 20 percent within two years. Productivity-enhancing CASE tools have been implemented for generating program code, estimating projects, modeling data and scheduling resources. In 1991, the systems-development team converted from DOS to OS/2 to boost productivity.

Hardware: A leased IBM 3090-400E mainframe currently runs 97 percent of applications. Novell LANs composed of PS/2s or Dell 486s are installed in various departments.

Software: CASE tools include Construct from Software AG, ESTIMACS from Computer Associates International Inc. and Project Workbench from Applied Business Technology Corp. The majority of applications are developed in-house using Natural, a 4GL from Software AG. Packages include Fixed Assets Accounting from Dun & Bradstreet Software, Lotus 1-2-3 and Freelance from Lotus Development Corp., WordPerfect from WordPerfect Corp., and Genesys from Genesys Software Systems Inc.

Communications: An AT&T Paradyne wide area network for data and communications links 34 remote sites with headquarters. The WAN features dedicated T1, DataPhone Digital Service 56K and dedicated digital lines.



WHEN IT COMES TO PERFORMANCE MANAGEMENT, LANDMARK HAS PRODUCT SUPERIORITY YOU CAN SEE.

For the best value in performance management, there's NaviGraph™ from Landmark. This powerful workstation based analytical tool gives you up-to-the-minute views and minute-by-minute records of system performance. It integrates real-time data from multiple CPUs, regions, subsystems, and other systems management tools. It helps you isolate problems, identify causes, and monitor thresholds. You can see all important data on one screen and create custom

displays and set exception conditions. And you can manage multiple platforms including MVS, CICS, VSE, VTAM, DB2, and soon UNIX from a single point of control. No wonder NaviGraph is being licensed by other vendors. They see our product superiority, too. Landmark Systems Corporation, 8000 Towers Crescent Drive, Vienna, VA 22182-2700. Call for more information: 1-800-488-1111.

LANDMARK™



TOOL TECHNIQUES

The Well-Armed Enterprise

Organizations with a strong survival instinct will see the wisdom of creating a diversified portfolio of development tools and techniques. But assembling the right ones can be a painstaking analytical enterprise.

BY MICKEY WILLIAMSON

The porcupine, equipped with a single response to every threat, will roll itself into a taut little ball in the middle of the highway, relying on its sharp-pointed quills to ward off an approaching automobile. Technology deals harshly with those whose arsenals contain only one weapon.

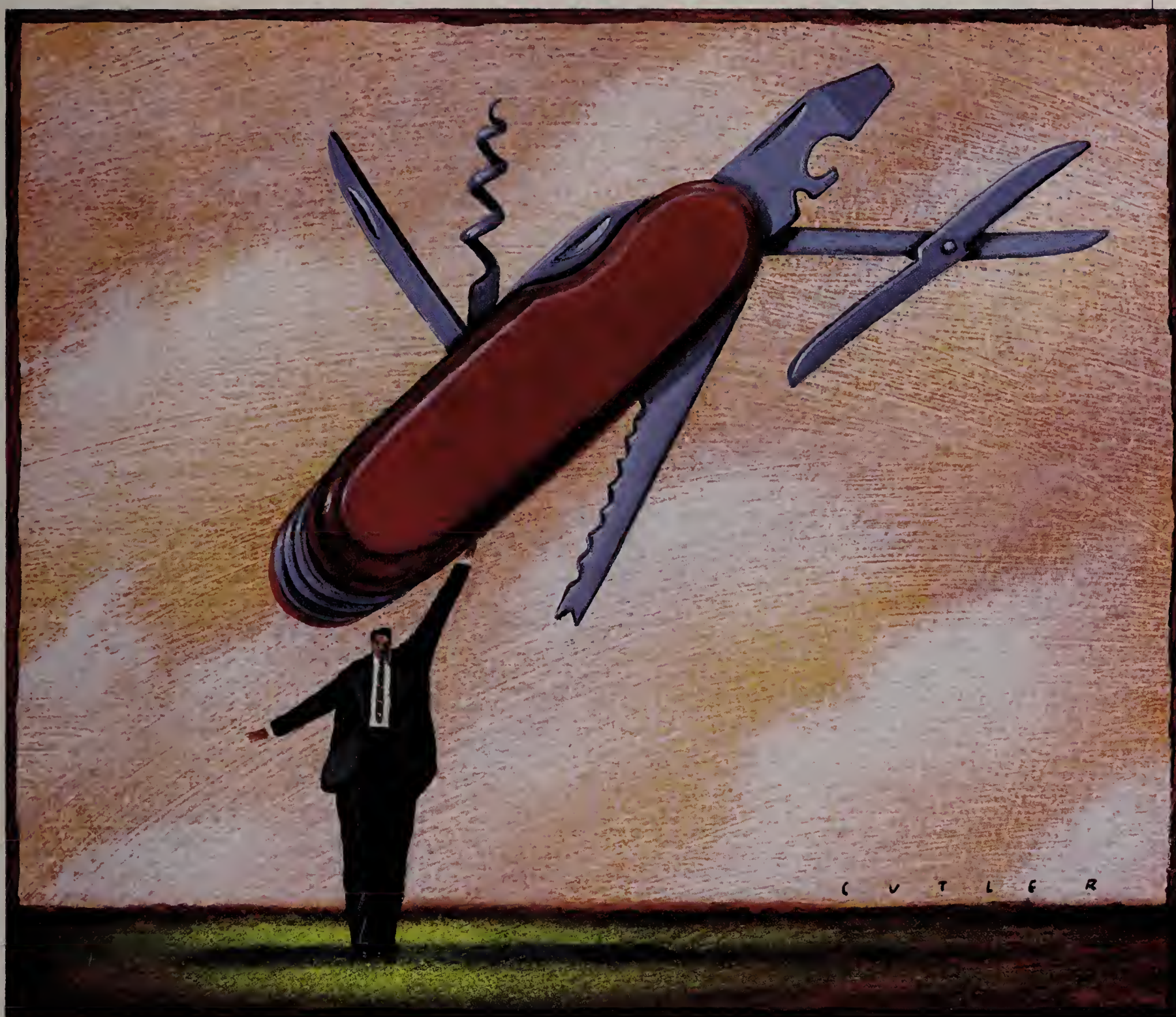
Like the porcupine, IS organizations equipped with only one

mode of response are likely to misinterpret the nature of the challenge before them. As the saying goes, "If the only tool you have is a hammer, then every problem looks like a nail."

Assembling a single set of tools to automate the creation of business systems is an attractive goal, one that appeals to management's wish for standards and economy. But trying to define every development objective in terms that can be met by this orderly assemblage is a recipe for disaster. "It's not necessarily true that you can find a single toolkit that will satisfy all your needs," said Victor Harrison, manager of

application development and methodology at Deere & Co., of Moline, Ill. "Most toolkits are not robust in all parts of the development life cycle."

Organizations with a strong survival instinct will recognize the wisdom of creating a diversified portfolio of development tools and techniques. Stockpiling tools by laying in a new set for each new project, however, is as misguided as having too few, as well as an obvious waste of funds. "You can have absolute chaos if for every application you come up with another toolkit that seems to be specific to it," Harrison said. Then too, "if you have a bunch of



tools that are very specialized, the question is how to make them all play together."

Finding the appropriate balance is a delicate task. "On the one hand, we don't want to limit the way people solve problems," Harrison said. "On the other hand, if you have too many tools you dissipate your ability to leverage knowledge and expertise in any one area."

Assembling a workshopful of the right tools can be a painstaking analytical enterprise. An orderly approach is needed to create an arsenal that will support a flexible, focused attack on today's business challenges. At Deere & Co., makers of farm machinery and equipment, work is underway to build an expert system that will gather information on a given problem and recommend an appropriate development

methodology and accompanying tools. Larry Bacon, senior vice president for information systems at The Travelers Cos. in Hartford, Conn., has established a small group whose charge is to "keep track of development tools and our utilization of them. As a project comes up, it behooves us to ask if it makes sense to use what we have or to branch off into something new." Laurie Rauch, vice president of information systems at Bowater Communication Papers Inc., a manufacturer of paper forms also in Moline, devotes 5 to 10 percent of her time to building a development environment and tools portfolio; about one full day of staff time per week is similarly allocated, she said.

IS organizations are expected to create a broad range of applications, each of which requires a different approach to analysis,

"Your choice of a methodology is intertwined with the management philosophy of the organization."

—Mike Hale

ILLUSTRATION BY DAVE CUTLER

design and construction. Not only are there more types of applications under construction than ever before, but the choice of architectures on which to deploy them has grown also. And each type of project and architecture suggests a different set of methods and tools. A formal IS development methodology must come first, according to Jerry Greene, information resource management project leader at the State of Florida's Information Resource Commission (IRC). Greene calls such a methodology "a time line with specific checkpoints, defined deliverables, and confirmed accountabilities and measurements."

The IRC's commitment to engineering

rigor in software development is so strong that in March 1990 it issued a directive giving the state's 26 independent agencies two years to select a methodology and another two years to implement it.

"Information systems are becoming a backbone of management, and how the systems are developed is a statement of where the organization is going," said Mike Hale, executive administrator of the IRC. "Your choice of a methodology is intertwined with the management philosophy of the organization." IRC staffers act as consultants to the agencies, helping identify needs and select methodologies and tools.

At one end of the methodology spectrum is information engineering, which specifies distinct life-cycle phases with names such as business-area analysis, information-systems planning and business-systems design. It places primary emphasis on defining the items of information that are important to the enterprise and how they relate to each other. Organizations that choose information engineering as their methodology will naturally limit their selection of tools to those that support its precepts.

At the other end of the spectrum is rapid prototyping, which looks first at the processes users follow to perform their work. Rather than the step-like traditional waterfall life cycle that suits information engineering, rapid prototyping—sometimes known as iterative development—takes a more spiral form: a little analysis, a little design, a little coding, some use and a critique by the user community, and another cycle or two (or more) of analysis, design and coding. Tools that dictate a formal, linear-development life cycle are inimical to the try-and-try-again nature of this process.

Most organizations stand somewhere between these two extremes. "Ours is a hybrid," said Lynden Tennison, managing director for knowledge systems at American Airlines in Dallas. (Tennison recently left American to become director of client/server development at Union Pacific Railroad in Omaha, Neb.) "We have an initial phase of formal analysis, which produces a high-level functional specification and design. At that point we enter the spiral, but we try to measure time lines a bit more than the spiral methodology typically does."

For some, the choice of methodology—and consequently the choice of tools—depends more on the people who will use the system than on the preferences of the IS

Tool Talk

There are two fundamental approaches to integrating development tools

After years of wrangling, the efforts of nearly a dozen technical-standards committees have generally coalesced in the past year. While it is unlikely that a single standard will ever exist for all development tools, the self-serving conflicts of the early years have largely been resolved. Two major approaches have emerged for integrating development tools.

Data integration's primary emphasis is on the ability of tools to share design information, or "metadata." This form of integration can be accomplished by two-way tool-to-tool interface, by file transfer, or through a central repository such as the one IBM had in mind when it launched the AD/Cycle program. Expert observers generally agree that the notion of a single, host-based repository is dead. The more likely alternative is to link multiple distributed repositories, associated with individual tools or tool clusters, through a client/server network. The Electronics Industry Association's CASE Data Interchange Format (CDIF), and the Information Resource Dictionary Standard (IRDS) of the American National Standards Institute (ANSI) are complementary standards that lead the way.

Control integration provides a mechanism for inter-tool communication that does not depend on bridges or interfaces. Instead, tools are connected to an integrating environment that passes messages from one tool to another. This gives each the same access to the other's functionality that the user has with keyboard or mouse. Standards efforts such as CASE Communique and the European Computer Manufacturers' Association's Portable Common Tool Environment (PCTE) are similarly complementary.

—M. Williamson

That's It!

It's an exhibition, with new products, new ideas, and new solutions. It's a conference, an educational forum which can open your eyes to new ways of solving problems. It's a meeting place where you can exchange thoughts with your peers. It's an industry forum where DEC can connect to IBM, McIntosh, Hewlett-Packard and many other systems. That's it. That's DEXPO and it's your best opportunity to make your DEC system compatible with the world. DEXPO.

Come see exhibitors and their products at DEXPO Spring '93.

DEXPO Spring is well on its way to filling the Inforum in Atlanta, GA with the exhibitors you want to meet. They'll be there to answer your questions, to provide solutions, to help you make your systems more efficient and your companies more profitable. That's it.

Open Systems Conference debut's at DEXPO Spring '93.

Today's information manager has two things on their mind - increased productivity and profitability without added expense. DEXPO has added a world class conference to open your eyes to new ideas in making your DEC and DEC compatible products work more effectively together. Topics include:

Achieving Enterprise-Wide Open Systems

A Guide to DEC-Other Vendor Integration

- IBM, HP, Sun, Unisys, Pcs, Unix System V

DEC and the Issues of the 90's

- Open Systems
- Operating Systems
- Network Management
- NAS
- Application Development
- DEC's Software Vision

To obtain registration information for DEXPO Spring '93 fill out the form and return either by mail or fax.

**DEXPO Spring
Exhibition & Open Systems Conference
June 8 -10, 1993
Inforum
Atlanta, GA**

• • • • •
Mail to: Registrar
DEXPO Spring
13760 Noel Road, Suite 500
Dallas, TX 75240

Fax to: 214/385-9003

Yes, I'm interested. Please send more information on:

☐ Attending ☐ Conference ☐ Exhibiting

Name _____

Title _____

Company _____

Address _____

City/State/Zip _____

Phone _____

Fax _____ CIO

DEXPO®

No one serves the DEC market better, no one can.

Produced by Miller Freeman, Inc.-A member of the United Newspaper Group ©1993 Miller Freeman, Inc.

Tools of the Trade

The following products were mentioned by IS executives interviewed for this article. The list provides only a small sampling of available tools and is not meant to be comprehensive.

TOOL TYPE/PROJECT PHASE	PRODUCTS	VENDOR	APPLICATION PLATFORM
Business modeling	IEF (v.5) ADW	Texas Instruments KnowledgeWare	MVS, VMS, Unix, OS/2, MVS, AS/400, OS/2
Analysis	IEF ADW Oracle CASE Tools (v.5) IE; Advantage (v.6)	Texas Instruments KnowledgeWare Oracle Information Engineering Systems Corp.	MVS, VMS, Unix, OS/2 MVS, AS/400, OS/2, MVS, VMS, Unix, OS/2, MS-DOS MS-DOS
Code generation	CA-Telon Cobol/2 Workbench (v.3)	Computer Associates Micro Focus	MVS, VSE, AS/400, OS/2, MS-DOS MVS, OS/2, MS-DOS
Testing	CA-Datamacs/II TestPro WITT (v.1, rel.2) Cobol w/Animator (v.3)	Computer Associates Sterling Software IBM Micro Focus	VSE, MVS OS/2, MS-DOS, Microsoft Windows MVS, VM, AS/400, OS/2 OS/2, MS-DOS, Microsoft Windows, Unix
3GL	Cobol/2 Workbench	Micro Focus	OS/2, MS-DOS, Microsoft Windows, Unix
4GL/DBMS/application generator	Adabas/Natural Linc/Mapper APS APT Workbench (v.5)	Software AG Unisys Intersolv Sybase	MVS, VM, VSE, VMS, Unix Unisys, Unix MVS, VSE, AS/400, OS/2, MS-DOS MVS, Unix, MS-DOS
Repository	DataDictionary/Solution (v.3) DB Excel	Brownstone Solutions Reltech	MVS MVS
Change management	CCC Endevor	Softool Legent	MVS, VM, VMS, Unix MVS, VM, OS/2, MS-DOS
Project management/estimating	Project Workbench/Project Bridge TimeLine Microsoft Project MicroMan	Applied Business Technology Symantec Microsoft Poc-It Management Services	Not applicable NA NA NA
Process/methodology management	Navigator Systems Development Guide IE; Advisor	Ernst & Young Poc-It Management Services Information Engineering Services Co.	NA NA NA
GUI building	PowerBuilder	Powersoft	DB2, SQL Server, Oracle, AllBase, XDB
Data analysis/decision support	Data Interpretation System Graphica Query Language Paradox Wingz DataPrism	Metaphor Andyne Computing Borland Informix Brio Technology	MS-DOS Macintosh/System 7, Microsoft Windows MS-DOS Unix, OS/2, MS-DOS, Macintosh, Oracle, Sybase Macintosh/System 7, Microsoft Windows
Document publishing	Technical Publishing System FrameMaker	Interleaf Frame Technology	NA NA
Knowledge-based systems	Aion Development System (v.6) ART-IM (v.2.5), CBR Express Topic (v.3.1)	Trinzic Inference Corp. Verity Corp.	MVS, VM, VMS, Unix, OS/2, MS-DOS MCS, VM, Unix, OS/2, MS-DOS VMS, Unix, OS/2, MS-DOS, Macintosh
Reengineering	Bachman/Analyst Capture/DBA Existing Systems Workbench Pathvu	Bachman Information Systems Viasoft CompuWare	MVS/DB2, IMS, IDMS MVS MVS

SOURCE: THE QWERTY GROUP



*Russell West
Senior Vice President
Strategic Planning
Comdisco, Inc.*

“There is a way to measure the quality of your technology decisions.”

“Don’t reduce your technology costs in such a way that they can’t *continue* to be reduced. The last thing you want is to save budget dollars today at the expense of mortgaging your future.

“With the right strategy, it’s possible to continually reduce your costs. Is your current strategy letting you do that? To find out, use the market as a yardstick. Compare what’s been happening to your expenses over the last few years with market trends. Then look at what’s likely to happen in the future. That’ll tell you the answer real fast.

“Every good technology strategy is built on a sound financial footing. That takes market knowledge and creativity. And that’s where Comdisco excels.

“If you’re not sure whether your strategy measures up to the realities of today, talk to us. We’ll show you some smart ways to solve your problems, and we’ll save you money. That’s Comdisco’s job, and nobody does it better.”

*Comdisco is one of the world’s largest and most experienced independent high-tech asset consultants.
Our strength is people like Russ West...people who know your problems and how to solve them.
Let us show you how to measure — and improve — the quality of your technology decisions.*



HIGH-TECH ASSET MANAGEMENT SOLUTIONS

FOR A FREE
INFORMATION PACKET
CALL 708-698-3000
EXT. 4530.

"The lack of a common environment for all development tools to operate in is the biggest stumbling block."

—Laurie Rauch

department. "Some users are extremely comfortable with [iterative development]," said Debra Kristopson, senior director of MIS for Stouffer Hotels and Resorts in Solon, Ohio. "Some users don't have the patience for it, and for those users we go into the traditional approach." Organizations that use a hybrid methodology, or more than one, are likely to need a wider variety of development tools on their workbenches.

Another factor to weigh in building a tool portfolio is the assortment of architectures on which systems will be deployed. Despite the trend toward distributed applications, most tools for analysis and design still assume that the system will run on a mainframe host with attached dumb terminals. Client/server development poses problems of timing and the partitioning of data and process that few tools address; another set of products is required to handle such questions.

At the Whirlpool Corp. in Benton Harbor, Mich., Dean Muller, director of information technology advancement, is working on a portfolio-building model in which tools are categorized by life-cycle phase. "We're using that model to define what tools we have today in each area, and from that to determine what tools we need," he said. Too often, he added, product literature seems to say that a tool is "good for everything. We want to classify [new products] so that people recognize tools that compete with or replace something they already have, to put them into context."

While methodology decisions narrow the choice of tools to some extent, and architectural choices narrow it still more, there remains the question of the role of CASE tools versus fourth-generation languages and their associated application generators. Only in some vendors' advertisements are these two tool categories mutually exclusive. "The promise of CASE technology is that you can do a much better job of analysis and design," said The Travelers' Bacon. "And if you do everything right in that category, you can generate good code. We spent quite a bit of energy analyzing that, and decided that it appeared to be true."

Not everyone expects CASE tools to culminate in automatic code generation, however. Deere and Co.'s Harrison spoke of "a black hole that still exists between upper CASE [analysis and design] and lower CASE [code-generation tools]. There are very few

CASE tools where you can take the upper CASE logical design and transform it into a real, running system." One alternative is to use a fourth-generation-language application generator for iterative prototyping, and then generate the code. Another, which Kristopson favors for applications that require subsecond response time, is to turn over the prototype design created using an application generator to a programmer for implementation in a third-generation language such as Cobol.

Even if you get your methodology, CASE tools, and fourth-generation application generators synchronized, you're still not done defining a complete toolkit, said Bowater's Rauch. "The lack of a common environment for all development tools to operate in is the biggest stumbling block," she said. She is looking forward to the day when a single operating environment—a sort of Microsoft Windows for development tools—will launch every product in the developer's toolkit, including object-management and testing tools. Work currently underway within various standards committees, and at the many vendors who send technical staff members to work on those committees, is starting to produce products to satisfy that wish.

But assembling the finest, most flexible and best-integrated toolset still will not guarantee successful development. "We have a three-pronged attack for addressing business problems," Tennison remarked: "The first and most important is people, the second is methodology and the last is the tools. If you have good people and a reasonable methodology, you can probably be successful. It may take a little longer and be a little bit more difficult, but you'll still be successful." The most important thing, he stressed, is to recruit and retain a superior development staff.

Rauch had this advice: "Make sure all of your development standards are in place before you buy a tool, and that you are completely comfortable with your development life cycle. If you're constantly having to change your methodology to incorporate tools, then your standards are wrong or the tools are moving in another direction. You need to understand your process before you try to add technology to it." □□

Mickey Williamson is a technical journalist in Warwick, Mass., who specializes in emerging technologies. She heads the Qwerty Group.



The Bigger You Think, The Smaller It Gets

With BT's Global Network Services, You're Always in Touch.

Going Further. Global operations can bring new challenges—cultural, technical, practical. But BT™ makes it smoother and simpler, because we've been there. We *are* there. Our international presence is

unmatched by any other communications company. That means you can cross continents and cultures and stay in control. No matter what you choose from BT's global portfolio, BT goes further for you.

Staying Closer. At BT, we make it our business to know yours. We tailor our technology to deliver the right solutions for you. Your investment is future-proof, with BT as your partner.

To find out how, call for our Going Further, Staying Closer brochure. 1-800-872-7654 in the U.S., or 1-800-874-7654 in Canada.



Going Further Staying Closer™

GLOBAL NETWORK SERVICES™, FRAME RELAY, VIDEOCONFERENCING, EDI, ELECTRONIC TRANSACTION SERVICES, MESSAGING, FINANCIAL TRADING SYSTEMS, AND GLOBAL NETWORK OUTSOURCING FROM **SYNCORDIA™**.

A Fair Shake

Businesses have to look out for their own interests when negotiating software-license agreements

BY LESLIE SRAGER

Contracts must be negotiated with care, particularly those that involve hardware and software—the heart of so many corporations today. In the area of software contracts especially, licensors are apt to prefer the agreement least binding on and most favorable to themselves. In order to protect their businesses, licensees must educate themselves about what issues a contract should cover and raise their concerns when they feel an agreement does not offer them adequate protections. They should also be aware of what compromises can be reached over common areas of dispute.

At their most basic, software-license agreements define what software is being licensed, how and for how long it will be used, and what amount will be paid for that use. Most form license agreements go no further, except to include provisions that protect the licensor, such as limitations on liability, restrictions against decompiling and copying, confidentiality provisions and causes for the licensor to terminate the agreement.

A common provision favoring the

licensor prohibits the licensee from changing the site of the license without written consent. The licensor may also require that the software be used only on the computer or computers designated in the agreement. In effect, these restrictions give the licensor a limited veto over how and where the licensee can conduct its business. Furthermore, they enable the licensor to impose an additional charge when the licensee upgrades its computers, even though no change in the software is required.

Licensees should strive instead for an agreement that permits them to move the site of the licensed software upon written notice to the licensor but without the licensor's consent. The licensee should also retain the right to run the software on any compatible hardware.

A significant point normally ignored by licensors is acceptance testing. Acceptance-test criteria should be established at the outset. Generally, the software should not be used productively by the licensee during the acceptance period. The test should take place in the licensee's environment, and the licensee should examine and test the effectiveness of the documentation.

Ideally, the terms of technology agreements should be fixed and thoroughly spelled out. Yet at the same time they must be fluid enough to adjust to changes in technology and business conditions. Licensees should require the licensor to keep the software current with changes in relevant laws and regulations, especially in heavily regulated industries such as finance or banking. Licensees should also require that the software be kept current with changes in the operating system on which it is to be run.

On occasion, a business may de-



PEOPLE WHO KNOW FINANCE CHOOSE SCO



International Banking

"We chose SCO Open Desktop because it was the most cost-effective solution available and it protected our power to choose from the widest range of computers, peripherals, applications, and vendors."

Paulo Afonso Monteiro
Director of Technology
and Networks
Banco Nacional, Brazil



Financial Information Services

"SCO operating systems have helped us ride the Intel technology curve and use industry-standard hardware to deliver state-of-the-art information services to our financial industry customers."

David Cutright
Vice President for Technology
Thomson Financial Networks



When it comes to getting the most from the UNIX® System and Intel®-based computers, industry leaders know the value of SCO® open systems software. Available worldwide, SCO UNIX Systems are the business choice for cost-effective trader workstations, global information servers, branch automation systems, and advanced platforms for developing networked, graphical applications. SCO systems process transactions fast and run applications efficiently at a cost per user that beats minis, RISC workstations, DOS LANs, or any other platform. For your free copy of an informational video that explains how SCO makes it all work, call SCO at (800) SCO-6561 (726-6561) today!

The Exchange

TORONTO STOCK

Stock Exchanges

"With SCO Open Desktop®, we have gained a significant competitive edge and taken a big step toward becoming the most technologically advanced stock exchange in the world."

Wayne Fowler
Director of Technology and Network Services
Toronto Stock Exchange



Brokerage Services

"With SCO Open Desktop and SCO support services, we were able to replace multiple proprietary information systems with

a single PC-based network. Now, each trader can access global market data and execute orders in our MASTERS® systems from a single desktop workstation."

Carmine Chiusano
Senior Vice President of Operations
Mayer & Schweitzer, Inc., a subsidiary of The Charles Schwab Corporation

SCO 
OPEN SYSTEMS SOFTWARE
The Business Choice™

sire a software change that the licensor either refuses or agrees to make only at an unacceptable time or price. In order to maintain as much control as possible, the licensee should negotiate for itself the right to have a third party make the change. In such an event, the third party must be able to look at relevant portions of the source code.

In addition, if the licensee is paying for a change, it should own it. If it does not spell out that right in the agreement, the licensee may find its competitors gaining access to a change that it funded. At the very least, licensees should negotiate a period during which the change cannot be marketed by the licensor.

A related issue concerns the availability of the source code if a problem should develop between licensor and licensee. The normal resolution is to place the source code in escrow and to determine what events would trigger its release to the licensee. Those events should include the licensor's bankruptcy, failure to maintain the software or decision to go out of the business of licensing or maintaining the software. The agreement should also stipulate that the source code in escrow be upgraded when the software itself is upgraded, and that the documentation be altered to reflect those changes. The licensee should negotiate the right to inspect periodically the software escrow to make sure it is the latest version.

Certain organizations specialize in maintaining software escrows (see "Support Groups," *CIO*, February 1992). Making arrangements with one of these might be better than working with the licensor's attorney or auditor.

The licensee should also try to place an anti-virus warranty in the agreement. These warranties can range from a representation by the licensor that the computer is free from viruses, to a "best efforts" representation, to a representation of the circumstances under which the software was developed, thereby minimizing the chance of a virus contaminating the software. Such warranties are difficult to negotiate: The issue is relatively new, and since

The licensee should try to place an anti-virus warranty in the agreement.

neither party may be at fault, questions of risk allocation are unusually complex.

Another provision, the intellectual-property indemnity, protects the licensee against costs and damages in litigation if a third party alleges that the licensor has violated its proprietary rights. The standard remedy, if the licensee is prohibited by a court from utilizing the software, provides that it be repaid a pro rata portion of the license fee, normally based on a five-year straight-line depreciation. But this may not be satisfactory: If the licensee has built an operation around a particular piece of software, acquiring a substitute can be costly, difficult and time-consuming, resulting in substantial business disruption. Negotiating a damages clause to cover such a contingency can only be done on a case-by-case basis.

Most licensors give maintenance cursory treatment in their standard agreements. Yet strong maintenance provisions are essential, in case a problem with the software develops and the licensor is unable or unwilling to respond. If the licensee does not have the source code, it is powerless to make any changes or fix any bugs.

Maintenance agreements should make clear that the licensor will address a problem within a specified period of time. Depending on the importance of the software and the nature of the problem, the agreement should also stipulate that the licensor will send someone to the site if the problem is not solved remotely. Maintenance personnel on-site should work continuously until the problem is solved. And there should be an escalation provision, stating that if the problem is not solved within a certain period, it will

be "escalated" to higher levels within the licensor's organization.

The maintenance agreement should also spell out the distinction between "updates," which fix bugs or allow the software to operate more efficiently, and "enhancements," which add functionality. The former are normally included in the maintenance fee, while the latter are offered at additional cost.

Whether licensees are compelled to install updates and enhancements is another area for negotiation. Licensors do not want to be obligated to maintain outdated software, but licensees may be perfectly happy with their software the way it is. The most popular option in such a situation allows the licensee to skip some versions of the software, but not to get so far behind that it creates an unreasonable burden for the licensor.

Although issues of liability limitation can best be addressed in the context of the total agreement, there are some points of which everyone should be aware. Invariably, license agreements exclude the licensor from consequential damages, and it is generally a waste of time to argue against that protection. However, licensees should make certain that they are also protected by this provision.

Licensees should resist the attempt to exclude direct damages, perhaps agreeing to cap such damages as a compromise. Again, the licensee should be protected by a similar cap. And the intellectual-property indemnity should be excluded from any cap on direct and consequential damages.

Acquiring the right software can be one of the best business decisions a company makes. Failing to protect its own interests when negotiating the contract may be one of the worst. An agreement that resolves all pertinent issues to the licensor's and licensee's satisfaction is the best road map for a true partnership of interests. ☐

Leslie Srager is a member of the New York law firm of Phillips, Nizer, Benjamin, Krim & Ballon, specializing in the computer and information technology area.



IT Leadership: New Realities, New Outcomes

SIM 1993 Institutional Member Conference

April 14-16

Rancho Mirage, California

A dynamic new approach for effective leadership in the learning organization

More Intense Learning

- ▶ Focused, practical, peer-to-peer learning
- ▶ Real-life, interactive case studies of IT leadership and business successes
- ▶ Introspective analysis of leadership styles and management expectations via the unique Predictive Index leadership profile
- ▶ Practitioner-led discussions that relate directly to your business challenges
- ▶ Working group findings from joint benchmarking research project on implementing TQM in IT

More Powerful Networking

- ▶ Testing ideas through Predictive Index leadership profile and case study breakouts
- ▶ Benchmarking
- ▶ Finding solutions through case study analysis
- ▶ Expanding business contacts
- ▶ Getting to know colleagues and peers

More Value-Added Takeaways

- ▶ Understanding the context of problems and solutions
- ▶ Exploring implementation issues
- ▶ Using Predictive Index leadership profile to boost effectiveness
- ▶ Evaluating solution strengths and weaknesses
- ▶ Developing conceptual models for business improvement

This conference will establish a new standard in executive education based on attendee feedback.

To request more information, fill out and return the form below or call SIM headquarters at 312.644.6610.

 **YES!** Please send me additional information about the 1993 Institutional Member Conference.

Name _____ Title _____

Company _____

Address _____

Phone _____ Fax _____

☐ I am a SIM member. ☐ I am not a SIM member. Please send me information about SIM membership.

Please return completed form via fax or mail to:

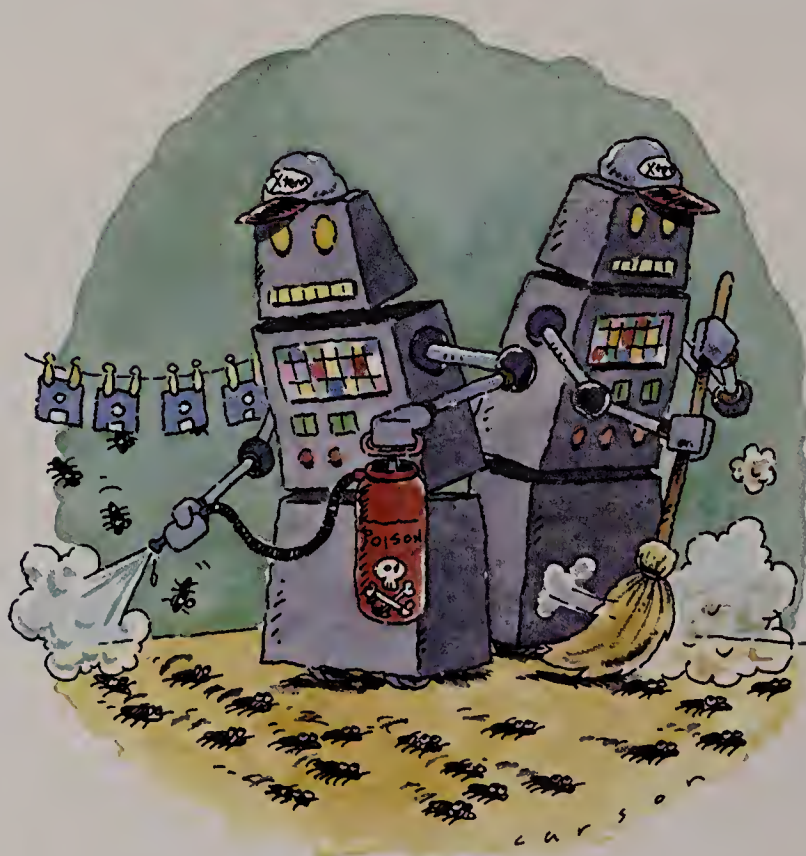
SIM
International

SIM Headquarters
401 North Michigan Avenue
Chicago, Illinois 60611-4267
Fax 312.245.1081

Bug Busters

Automated software-testing tools can dramatically decrease the error rate of manual methods, but the price of admission can be high

BY LUCIE JUNEAU



Application testing, traditionally the last and most neglected software-development chore, has been steadily gaining respectability. As automated tools replace manual methods, software testing is becoming more effective and affordable. No longer the exclusive purview of the IS cleanup crew, a.k.a. the quality-assurance group, testing is now being introduced early in the application-development cycle and transforming the development process itself.

Although any testing may be better than no testing at all, manual methods are often inadequate, developers agree. There is never enough time or staff to perform all of the tests needed to ensure product quality, and some tests that could easily be executed with automated tools are impossible without them. Slow, laborious and prone to error, manual testing often succeeds only in giving developers a false sense of confidence. In fact, according to Boris Beizer, an independent consultant and the author of *Software Testing Techniques*, the error rate in manual testing tends to exceed the bug rate in untested software.

In recent years there has been a steady migration to automated testing. Many of the earliest automated tools were costly and unwieldy. As they became cheaper, faster and easier to use, however, their advantages became

more obvious, particularly when the labor costs inherent in manual testing and the consequences of releasing bug-ridden software were considered.

Bugs set off an expensive chain reaction. They lead to user complaints and compromise IS credibility. They can necessitate recoding, documentation updates, regression testing and the release of updated software. It's not big news that bugs are much more expensive to fix after a product is released than during the application-development cycle. IS organizations save at least \$4,000 for each bug they find before release, analysts maintain. To budget-conscious IS organizations—many facing pressures to outsource and/or downsize—such savings are attractive.

Experts caution that introducing automated testing involves more than simply collecting the products and setting them in motion. To achieve the greatest return on their investments, IS organizations must place a greater emphasis on the testing process and implement it earlier in the development cycle.

Many IS organizations fail to get the most out of testing tools because they don't give programmers enough time and training to master them. To succeed, IS directors need to phase in tools systematically and demonstrate their commitment to new testing procedures. Training developers to use individual tools isn't nearly as big a challenge as developing and implementing more effective, efficient testing processes, consultants say. If testing products aren't introduced within the framework of a supporting infrastructure, they may end up as shelfware.

Implementing testing software is a long-term investment. In the short run, organizations deploying such products should expect protracted pro-

XEROX

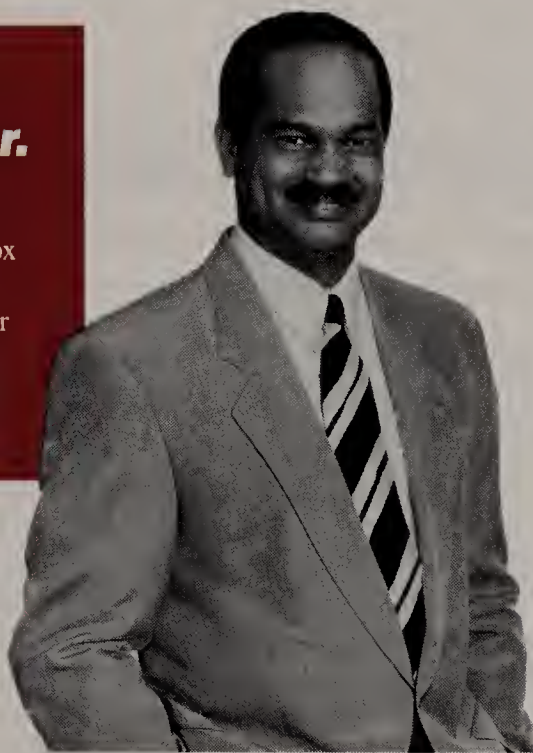
To speed up cash flow, they needed to capture and bill 98% of each day's receipts. 365 days a year.



What we put together.

A systems integration team, sixteen 9790 Xerox laser printers, one national service manager to call, and the Xerox Total Satisfaction Guarantee.

Stephen Perry
National Account Manager
Service Marketing



A major financial institution wanted to invest in a system that would increase revenue by decreasing their mean days to bill. And they also wanted the added dividend you enjoy when you combine new technology with the investments you've already made.

To help them meet the challenge, Steve Perry and a team from Xerox worked closely with third-party system integrators to co-develop all software and hardware. Sixteen 9790 Xerox laser printers were linked to existing CPUs so both image and data could be printed simultaneously at the unprecedented speed of 120 pages per minute.

The results? The system handles tens of millions of pages each month and uptime during billing cycles is over 98%. So 98% of each day's receipts are billed on the day they're received. Which beats the industry norm of 80%.

And that's the kind of profit any financial enterprise can easily appreciate. To learn how we can put it together for you, call 1-800-TEAM-XRX, ext. 611B.

Xerox
The Document Company

duction schedules, increased demands on development staff and a falloff in software quality. IS directors are doing well if a suite of tools pays off in three or four projects after three years, Beizer said.

One vendor has estimated the cost of implementing an integrated set of testing tools at \$60,000—expensive, but much less than the \$250,000 that comparable tools cost back in 1986. Moreover, since IS organizations tend to deploy a variety of complementary tools over a period of two to three years rather than implement multiple tools concurrently, the cost can usually be spread out.

Before it starts shopping, the IS department should carefully consider how much testing it really needs. That may depend on the nature of the applications being developed. How critical are they to the organization's operations, and what are the risks and possible costs of deploying potentially problematic software?

Until recently—and at many organizations, even today—testing was conducted after product development, typically by a quality-assurance (QA) group. Often behind in their production schedules and eager to get their products out the door, IS organizations frequently cut testing short.

Today, it is becoming much more common for individual developers to test their own code. When all developers have tested their contributions and the application's components have been integrated, the software is turned over to the QA group, which puts the complete application through its paces.

The emphasis is thus shifting from failure detection to prevention. Test cases (sets of input values designed to indicate whether an application will run as specified) can be developed even before any code has been written. Ideally, these cases are based on an application's requirements, which are established before any design work begins. If developers are given requirements-based tests before they begin to write code, they will design a product that can pass those tests and will therefore be much more likely to meet all of the ap-

plication's pre-established requirements, according to Bob Poston, president of Programming Environments Inc., a vendor offering testing solutions.

To implement effective testing processes—and the most efficient development practices—right from the beginning of the application-development cycle, users may want to

Training developers to use individual tools isn't nearly as big a challenge as developing and implementing more effective, efficient testing processes.

enlist tools to help them capture and analyze requirements for the application about to be designed. Many CASE products provide such tools. In addition, some testing-software vendors, including Cadre Technologies and Tiburon Systems Inc., offer products—known as requirements recorders—that help developers identify testable requirements. Tools that generate test cases based on requirements specifications include Programming Environments' T and Bender & Associates Inc.'s SoftTest. The test cases are then run on test-execution systems. (Mercury Interactive Corp.'s XRunner and Tiburon Systems' Ferret can run test cases generated with Programming Environments' T, for example.)

To date, most IS organizations using state-of-the-art testing tools appear to be using their own, custom-designed tools and/or products purchased from multiple vendors. Very few vendors offer soup-to-nuts solutions. (One that comes close, Software Research Inc., offers an integrated set of products called Software TestWorks [STW] that includes cov-

erage analyzers, automated regression products and test-planning tools.) In any case, users generally prefer purchasing "best of breed" products. But organizations that use multiple vendors' products may need to build links among them, unless the vendors have collaborated to provide the necessary interfaces.

In the future, open systems and standardization will make integrating tools a lot easier. And some vendors are moving closer to offering turnkey testing solutions. For instance, in addition to integrating the testing solutions in its extensive product suite, Computer Associates International Inc. plans to make its products easier to use by offering a single interface across platforms.

Many IS organizations first venture into the world of automated testing via capture-playback tools. These allow developers to run test cases and capture test sessions by recording screen-level events (keystrokes and mouse movements, for example). They are particularly useful for performing regression tests, allowing developers to test modified software using test scripts captured and saved during previous executions. Products include Compuware Corp.'s Playback, Computer Associates' Traps, Tiburon Systems' Ferret, Mercury Interactive's XRunner and TestRunner, AutoTester Inc.'s AutoTester and Software Research's CAPBAK/X.

Some capture-playback tools, such as Bender & Associates' SoftTest, are capable of generating the test cases they execute; others are not. Some, including AutoTester, can provide scripts for test cases generated by third-party products. (AutoTester, for example, can execute test cases generated by either SoftTest or T.)

Companion tools for use with capture-playback systems include utilities that compare files or databases to verify that actual outputs match what was expected. Software Research includes a file-comparison tool along with its CAPBAK/X tool in a suite of automated regression products. Mercury Interactive and Ben-

How Does Avis Help Customers Continue Flying Even After They've Landed?



For airport car rental customers, timing is very important. Yet no matter how hard Avis tried, they could only speed the rental process so much without the help of

The Answer is ARDIS.

ARDIS information systems experts and the ARDIS nationwide wireless communication network.

Now, Avis Preferred customers go directly to the Avis courtesy bus. Drivers use an on-board computer to key in the customer's Wizard number. That information is sent via ARDIS to the Avis mainframe computer in Garden City, New York. Then, in seconds, the computer sends back the model and color of the car, as well as its lot location. A copy of the rental agreement is printed out for the Avis Agent, who places the copy and keys in the car. And within only minutes, the customer is dropped off at the car, ready to go.

"ARDIS made it possible for us to dramatically increase customer service. Now more of our customers spend less time at the airport."

— Robert Salerno,
Senior V.P./General Manager
Avis

That's just one way that real-time information solves real-life business problems. For wireless expertise in data communications, network management, application development and systems integration, call 1-800-662-5328, ext. 400.

ARDIS

*Real-time information solutions for
real-life business problems.*

ARDIS is a partnership of IBM and Motorola

der & Associates also offer file-comparison capabilities.

Some capture-playback tools run on the same platform as the applications being tested. These "intrusive" tools may cloud test results by affecting the CPU's performance. Many of the newest capture-playback systems are PC- or workstation-based and are nonintrusive. Some, such as Ferret, are combination hardware/software products that run on their own dedicated machines. (Ferret comes with a 486 workstation.) Others—software-only products like Computer Associates' Traps—are installed on the user's PC but can be used to test mini- or mainframe-based applications. In addition to providing less ambiguous test results, such products conserve mainframe resources—and postpone the need for mainframe processor upgrades—by allowing users to offload testing operations from a mainframe to a PC environment, according to Don DePalma, an analyst at Forrester Research Inc.

Using capture-playback tools to achieve savings in regression testing can be a very smart move, because the cost of updating existing applications can consume a hefty chunk of an IS organization's budget. IS directors should start the test-automation process by applying automation solutions to their biggest headaches, according to Dave Sharon, president of CASE Associates Inc., a research and consulting firm based in Oregon City, Ore. Often, improving the economics of software maintenance is one of the first steps toward measurable improvements.

Other popular testing products include tools that help establish the viability of a developer's code. Metrics tools such as SET Laboratories Inc.'s PC-Metric identify areas of complex coding to help programmers determine which parts of their applications should be redesigned or tested most rigorously. (The more complex the code, the more likely it is to include errors.) Code checkers, such as Abraxas Software Inc.'s CodeCheck (for C and C++ applications), check for coding problems that can compromise an application's

Some capture-playback tools run on the same platform as the applications being tested. These "intrusive" tools may cloud test results by affecting the CPU's performance.

portability or maintainability.

Test-evaluator products help users determine the validity of their testing. They may indicate how much of a program has been exercised by determining which program statements have executed, for instance. Some code-coverage analyzers, including Verilog Inc.'s Logiscope and AutoFlow by AutoCASE Technology, work by inserting probes in the form of tracing statements into the code being tested. Requirements-coverage analyzers, on the other hand, evaluate tests to determine if they are demonstrating that the code has fulfilled all of the initial requirements. (Programming Environments' T includes a requirements-coverage analyzer.)

Users may also need test-management software. These tools help users manage their test libraries, which must be kept up-to-date to be useful. Based on changing applications requirements, Bender & Associates' SoftTest, for example, helps users evaluate their existing test cases to see how they should be changed or supplemented. Tests must be changed every time an application's code is changed.

CASE tools can help increase programming productivity but typically do not include comprehensive testing features. So CASE users who don't purchase testing tools may find themselves with a lot of untested or undertested software. Shops using CASE should be careful, however.

Although testing products such as code checkers and metrics tools will generally work with software created in a CASE environment, they might indicate problems where there are none, because of idiosyncracies in the CASE-generated code, some analysts say. IS organizations should make sure that the tools they're considering are really compatible with their own CASE products.

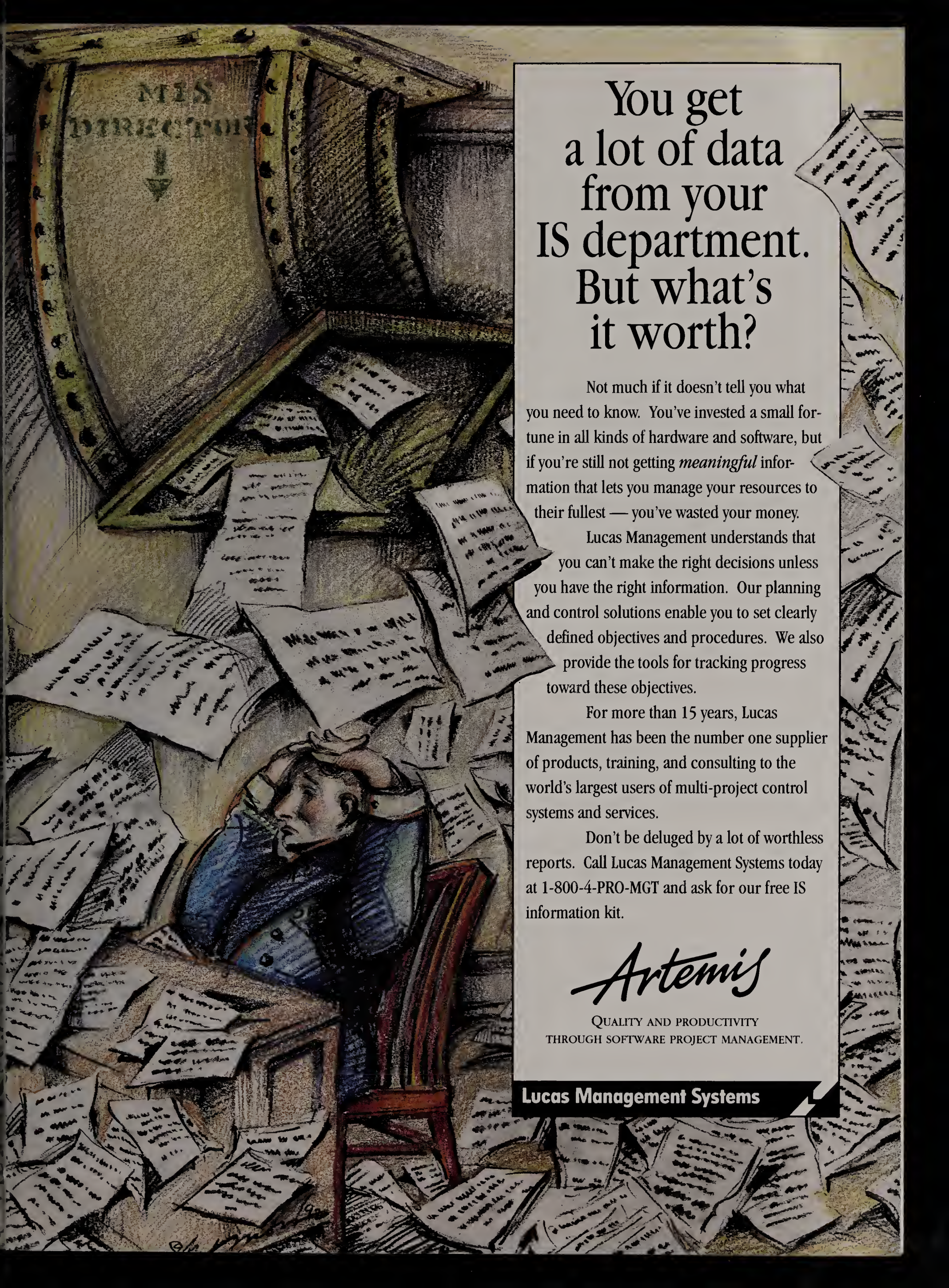
Some vendors claim that their products are particularly adept at interacting with CASE tools. Software Recording's test-case generator, for instance, can generate tests from CASE design documents. Tiburon System's Ferret can generate data-dictionary elements—which Programming Environments' T then uses to generate test cases eventually executed by Ferret—from CASE-generated data-flow diagrams.

Some CASE vendors, including Cadre Technologies (which incorporates third-party testing tools into its Ensemble), offer unified CASE products that feature automated testing tools within a comprehensive CASE environment. But while there is a trend toward integrated CASE solutions that provide everything from design assistance through testing, such products don't yet enjoy the same credibility as CASE products with more specialized capabilities.

For a complete listing of available testing products, users may want to consult the *Testing Tools Reference Guide*, published by Software Quality Engineering Inc. in Jacksonville, Fla. Jerry Durant, the *Guide's* author, suggests that IS organizations resist sampling product demos until they've defined their requirements.

The startup costs and time required to make a transition to automated-testing tools still intimidate many IS organizations struggling to meet tight budgets and deadlines. But considering the costs that software bugs generate and the generous supply of tools now available, most IS organizations can't afford to ignore automated software-testing alternatives. ☐

Lucie Juneau is a freelance writer based in Salem, Mass.

A detailed illustration of a man in a blue sweater sitting at a desk, looking extremely overwhelmed. He is surrounded by a massive, chaotic pile of papers, forms, and documents that reach up to the ceiling. In the background, a large filing cabinet is visible, with the words 'MIS' and 'DIRECTOR' partially legible on its drawers. The man's hand is pressed against his forehead in a gesture of despair or frustration. The overall scene conveys the frustration of being buried under too much data.

You get a lot of data from your IS department. But what's it worth?

Not much if it doesn't tell you what you need to know. You've invested a small fortune in all kinds of hardware and software, but if you're still not getting *meaningful* information that lets you manage your resources to their fullest — you've wasted your money.

Lucas Management understands that you can't make the right decisions unless you have the right information. Our planning and control solutions enable you to set clearly defined objectives and procedures. We also provide the tools for tracking progress toward these objectives.

For more than 15 years, Lucas Management has been the number one supplier of products, training, and consulting to the world's largest users of multi-project control systems and services.

Don't be deluged by a lot of worthless reports. Call Lucas Management Systems today at 1-800-4-PRO-MGT and ask for our free IS information kit.

Artemis

QUALITY AND PRODUCTIVITY
THROUGH SOFTWARE PROJECT MANAGEMENT.

Lucas Management Systems

FYI

New Help for the Insecure

Photo IDs matter when you look underage and want to buy beer; they matter even more when you're handling security for a major company. Polaroid's new security-management systems protect and serve corporations and health-care organizations.

The new systems feature pre-configured databases, data-entry screens and flexible badge-design software. They enable users to capture and store portraits and data, issue badges, maintain local and remote databases and deliver audit and management reports.

The Healthcare Security Management System can be used for infant protection, wanderer control or other security needs. The Corporate Security Management System ensures that terminated employees no longer have access to property and critical information.

Both systems support a standard stand-alone verification station, input/output and storage options, optional software modules, film and supplies, and lens and lighting accessories. They are available in instant-film (starting at \$25,990) and thermal (starting at \$26,990) versions. Call 800 225-1618.



How to Build a Better Warehouse

The concept: a data warehouse to store, catalog and maintain historical data, keeping it ready and waiting for easy access by executive information systems or other decision-support applications. The problem: It could take as many as 150 different, tedious programs to build the thing and get the data in there the way it ought to be.

PRISM Solutions Inc. suggests it can eliminate the tedium of manual data-warehouse design by automating the process with its PRISM Warehouse Manager tool. IS staff can use the PC-based, menu-driven tool to define from which applications or operational databases data will be extracted and how it will be automatically converted, condensed, time-stamped and integrated into the database warehouse. Currently, the product supports IBM's DB2 and its Information Warehouse concept. But PRISM president James Ashbrook said the company plans to support Oracle, Sybase and other database platforms.

The Warehouse Manager, which began shipping in October, sells for \$80,000 to \$170,000. The company can be contacted in Sunnyvale, Calif., at 408 481-0240.

Developing Your Objectivity

Want to upgrade the technology in your software applications and move toward more distributed, modular, object-oriented systems while continuing to leverage existing investments? Lakota, a portable shell language and embeddable kernel from Software Maintenance and Development Systems Inc., allows developers to "glue" existing modules, utilities, command interfaces and other legacy software together so that it operates as a single unified program. The code is portable across operating systems and supports named procedures, scoped data, inheritance and block structured code.

The product is available as a portable shell language alone (Lakota/IS) and as a shell with an embeddable kernel (Lakota/IL). The language enables rapid prototyping and provides a consistent, ready-to-use interface for different user programs, third-party applications and utilities on different hardware platforms and operating systems. The kernel allows applications written independently of each other to interact as if they were purposely designed to be part of a single system. It can both encapsulate programs within systems and enforce an object-oriented behavior on those systems.

Pricing for the shell starts at \$99 per user for volume purchases; rights to internal use of the embeddable kernel are \$3,000. For more information, call 508 369-7398.

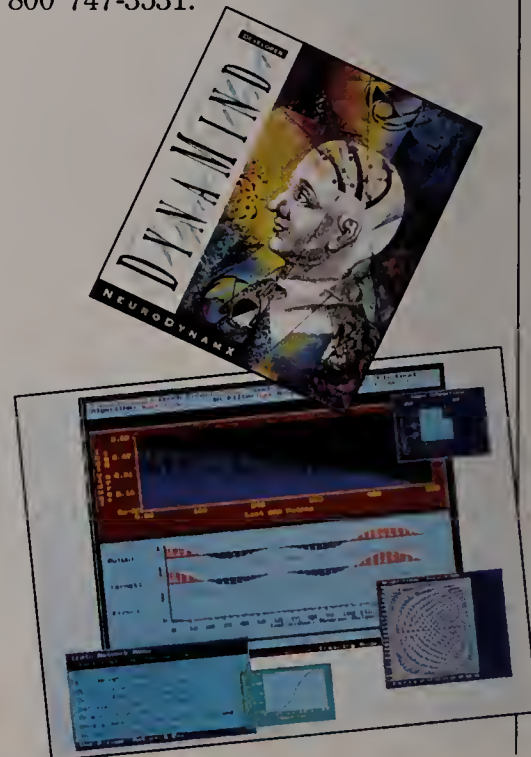
Roll Over, Boy!

Suppose you could buy an inexpensive PC-based software package and train it to perform a wide variety of analytical or predictive functions? What you'd have is an unpretentious little neural network called DynaMind, from NeuroDynamX (better call it NDX), of Boulder, Colo.

NDX, which has a joint development relationship with Intel Corp., grew out of the project to write the software used to train Intel's Electrically Trainable Analog Neural Network chip (which NDX president and cofounder Ron Benson helped design).

Two of DynaMind's training algorithms teach the neural net to solve such static pattern-recognition and classification problems as image identification, data compression and loan evaluation. A third, proprietary algorithm called TrueTime enables dynamic time-dependent problem-solving such as sales or inventory forecasting. NDX customers are using DynaMind for applications as diverse as acoustic diagnosis of electric-motor performance and stock-market trend-spotting.

DynaMind retails for \$145; it runs on a 286 or higher PC with at least 640K of RAM, DOS 3.0 or higher and an EGA or VGA monitor. Call 800 747-3531.





WHEN IT COMES TO MAKING DECISIONS, GET TO THE POINT.

Now let the world's second largest computer maker help you make one decision that will impact decisions out in the field. The Fujitsu 325Point™ pen computer, from Fujitsu's Decision Series.

Inside and out, 325Point was built for portability. Its flexible platform supports multiple operating systems such as Windows for Pen,™ PenDOS™ and PenPoint™ as well as the latest software tools. So developers can easily design custom pen applications and field workers can enter data, process information efficiently and make better decisions on the spot. Plus 325Point's PCMCIA expansion capa-

bility gives you increased data storage and multiple communications options.

Small in size and big on brain power, this three pounder boasts an Am386™ SXLV microprocessor. Fujitsu's power management technology and 325Point's long battery life make it easy to put in a full day of computing. And a backlit screen makes reading easy on the eyes.

Decisions, decisions. Now there's a point where they've become easier. 325Point.

Contact Fujitsu: 1-800-831-3183 or FAX (33) 92-94-58-99 for international inquiries.

FUJITSU

325Point™ is a trademark of Fujitsu Personal Systems, Inc. All other brands and product names are trademarks of their respective holders.

COMPUTERS, COMMUNICATIONS, MICROELECTRONICS

Maybe it's time to look at your phone system objectively.

Maybe the footprint's too big. Maybe the architecture's too fixed. Maybe it's missing some features you need.

Maybe the management module's inadequate. Maybe adds, moves, and changes are a pain. Maybe maintenance is a nightmare.

Face it. That PBX that was state-of-the-art a few years ago might very well be on the verge of extinction today.

But what can you do? You can't put in a new PBX on a whim. That would be too much stress on your people—and your capital budget.

**INTELLIPATH II® DIGITAL CENTREX
COULD BE YOUR ANSWER.**

Maybe the right PBX is no PBX.

Intellipath II Digital Centrex is a feature-rich telecommunications system for businesses needing 10 to 10,000 lines. Voice Messaging, SMDR, ACD, and many other options can be added to the basic service.

The system is central office-based. That means no footprint at all. It means a constantly evolving open architecture that lets you upgrade to ISDN, or to new features as they come on line. It means maintenance is our problem, not yours—New York Telephone monitors the system 24 hours a day.

Best of all, it's a subscription service—no capital investment required. Responsibility for the system rests in New York Telephone's hands.

So if your current phone system is approaching fossil status, contact your New York Telephone Account Executive, an Authorized Sales Agent, or call us at 1 800 942-1212, Operator 20 for a detailed brochure.

We're all connected.



New York Telephone

A **NYNEX**® Company





I N D E X

Page numbers refer to the first page of the article(s) in which the company is mentioned. This index is provided as a service to readers. The publisher does not assume any liability for errors or omissions.

Company Index

AT&T 14, 60
Abraxas Software Inc. 82
American Airlines. 22, 70
Apple Computer Inc. 14
Applied Business Technology Corp. 60
AutoCASE Technology. 82
AutoTester Inc. 82
Baystate Health Care. 50
Bell Atlantic Corp. 28
Bender & Associates Inc. 82
Blockbuster Entertainment Corp. .. 14
Blue Cross/Blue Shield 36
Bowater Communication Papers Inc. 70
Cadre Technologies 82
Carnegie Corp. 22
Chevron Canada 28
Chrysler Corp. 28

CIGNA Insurance Corp. 36
Citicorp 22
Computer Associates Intl. Inc. . 60, 82
Compuware Corp. 82
Deere and Co. 70
Dell Computer Corp. 60
Digital Equipment Corp. 14
Dow Chemical Co. 28
Dun & Bradstreet Software. 60
E.I. du Pont de Nemours & Co. ... 36
Electronic Data Systems 14
Forethought Group Inc., The 50
General Motors Corp. 22
Genesys Software Systems Inc. ... 60
Georgia Gulf Corp. 50
Hitachi Data Systems Inc. 14
Home Insurance Co. 36
IBM Corp. 14, 60, 70, 88
Intel Corp. 88
International Paper Co. 50
Lotus Development Corp. 28, 60
Mary Kay Cosmetics Inc. 14
Massachusetts Mutual Life Insurance Co., The. 28
Mercury Interactive Corp. 82
Microsoft Corp. 70
Mortgage Guaranty Insurance Corp. 36, 50
NCR Corp. 36
NeuroDynamX. 88
Novell Inc. 60
Oracle Corp. 88
Perdue Farms Inc. 60
Polaroid Corp. 88
Powersoft Corp. 36

PRISM Solutions Inc. 88
Programming Environments Inc. ... 82
Q Systems Research 14
SAP AG International. 28
SET Laboratories Inc. 82
Software AG 60
Software Maintenance and Development Systems Inc. 88
Software Quality Engineering Inc. ... 82
Software Research Inc. 82
Stouffer Hotels and Resorts 70
Sudbury Systems Inc. 14
Sybase Inc. 36, 88
Tiburon Systems Inc. 82
Travelers Cos., The 70
US WEST Marketing Resources. ... 14
Union Pacific Railroad 70
Unisys Corp. 36
Univar Corp. 14
Van Waters & Rogers Inc. 14
Verilog Inc. 82
Virginia Power 36
Wal-Mart 22
Whirlpool Corp. 70
WordPerfect Corp. 60

Advertiser Index

3Com (Regional). 32A
AT&T Technologies. 45
Advanced Network Services 67
Andersen Consulting 17
ARDIS 85

BMC Software. 15
BT North America 77
Bell Atlantic 54
Boole & Babbage Inc. 34
Borland International Inc. 41
CIO Publishing Inc. 8A, 33
Comdisco 75
Computer Associates International Inc. 2, 38, 65
Computron 53
Cushman & Wakefield. 9
Dexpo. 73
Digital Equipment Corp. C2
ERI. 11
Fujitsu Ltd. 89
Information Builders Inc. 23
Informix. C4
James Martin Insight Inc. 91
Landmark. 69
Lotus Development Corp. 42
Lucas Management Systems. 87
Minolta Corp. 57
New York Telephone. 90
Prism 26
Rolm Corp. C3
SAP America Inc. 59
SCO 79
Society for Information Management. 81
Software 2000. 5
Software AG 25
Sybase 21
Texas Instruments Inc. 12
Unisys Corp. 6
Wellfleet Communications 19
Xerox Corp. 83

James Martin Insight Presents...

IT VIDEO JOURNAL

Minimize the Risks of Selecting and Adopting New Technologies

A video journal that offers a series of discussions which can help you make **effective** technology selection and **implementation decisions** about Business Process Reengineering, Downsizing, Client-Server, CASE and Object-Oriented.

If you want to **succeed**, don't risk guessing about which technologies are right for your organization.

Call today for more information.
1-800-526-0452 or 708-983-4808.

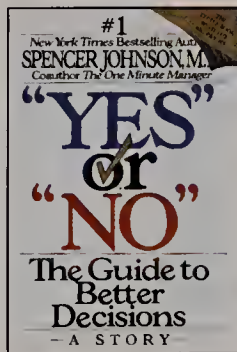
JAMES MARTIN
INSIGHT
INC.

OFF THE SHELF

"YES" OR "NO"

The Guide to Better Decisions

By Spencer Johnson
HarperCollins (New York), 1992
102 pages, \$17.50



"Yes" or "No," yet another entry in the already overpopulated ranks of self-help books, is touted as "the little book with the big payoff." With slightly more than 100 pages of text interspersed with ample white space, the book certainly is diminutive. Yet the size of the payoff will depend upon how much experience the reader has with the basics of decision-making. And since "Yes" or "No" appears to be aimed primarily at managerial-level businesspeople, who constantly face much thornier issues than the type addressed here, the payoff isn't likely to be all that impressive.

Johnson, coauthor of *The One Minute Manager*, has chosen to deliver his points in the form of a narrative. His protagonist, "the young man," spends a weekend on "The Hike," a kind of managerial Pilgrim's Progress in which the goal is the secrets of better decision-making. Along the way he meets a slew of characters, including brusque Frank Neal, the chairman of a major Chicago corporation, and the popular Nigel "Wings" Macleod, the Australian founder of a major airline.

The cast rivals *General Hospital's* in size; unfortunately the plot is not equally engrossing. A compelling storyline is less important in a self-help book than in a work of fiction. But when an author chooses such a method in order to make an argument more accessible, he or she should make sure that purpose is being served. As it is, the many unattributed bits of dialogue make for slow-going. And the characters

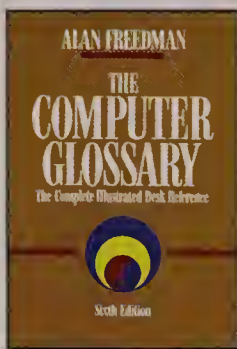
sound almost identical as they offer the young man advice.

Like the advice in so many self-help books, the offerings here are straightforward and not especially earth-shaking. The characters refer often to "The Map," which charts a course for a cool head and a warm heart. They stress that abandoning a poor decision is a prerequisite to making a better one. And they instruct our hero—who asks an awful lot of pesky questions—in the differences between simple and simplified, complicated and complex.

To be fair, the problems with "Yes" or "No" may be the fault of the genre rather than the author. Self-help books thrive because the advice they offer sounds so darn easy to follow. Better decisions? No problem. Listen to your heart. Be honest. Abandon illusions. Sure. And all Jose Canseco has to do to break Maris's record is hit two homers a week....

THE COMPUTER GLOSSARY, SIXTH EDITION

By Alan Freedman
Amacom (New York), 1992
574 pages, \$36.95



Glossarism is an art form all its own, and no small part of the art involves knowing thine audience. Last year we reviewed in this space a book by Peter G.W. Keen (*Every Manager's Guide to Information Technology*) whose noble aim was to demystify for non-technologists some of the forbidding arcana that enshrouds technology concepts. Keen succeeded admirably, in our judgment, in part because in performing the service of distinguishing forest from trees he understood well the needs of his anticipated readers. Keen's definition of the "client/server model," for example, read much like a description of Mount Fuji written for readers who will probably never climb it but will need to be able to nod

convincingly in conversations about it.

Alan Freedman's readers are more likely to be engaged in climbing Mount Fuji, or at least to be employed as Sherpas or (worse, perhaps) as the journalists covering the climb. The definitions he offers are the ropes, pitons and handholds upon which a reasonably well-informed ascent will be based. His no-nonsense definition of "client/server" stresses the relationships among interacting machines and programs—which platform owns which data and instructions and does what with them. He omits the "sociology" of the model, and the historical developments that led to it, with which Keen contextualizes his less-well-anchored readership.

Freedman calls *The Computer Glossary* his "life's work." And clearly his aim is to be comprehensive. ("Click: To select an object by pressing the mouse button when the cursor is pointing to the required menu option or icon.")

If something is worth remembering (and even on occasion when it's

not), Freedman has probably included it. However, the result is impressive rather than daunting. The history of computing unfolds willy-nilly (but in alphabetical order) as one browses. And while Keen's target readership might have to hike a ways through Freedman to extract something of special value to them, it's still accessibly present. The definitions are written in clear, concise lay language, though some may send you caroming to others for further instruction. ("Leaf: In database management, the last node of a tree.")

The volume also benefits from some nifty illustrations that run from the mundane (the keyboard position of the return key) to the whimsical (an 1890 cartoon vision of automation). And readers not in dire need of a six-page listing of electronic bulletin boards or the three pages devoted to plugs and sockets can still enjoy such information nuggets as the fact that in 1935, IBM was sharing its London office with a company that manufactured electric meat choppers. Thus can definitive occasionally become delightful.

Editorial, Advertising and Business Offices: 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208, (508) 872-8200. **Postal information:** CIO (ISSN 0894-9301) is published monthly; and semimonthly in April, May, June, September, October and November by CIO Publishing Inc., 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208. Second-class postage paid at Framingham, MA, and at additional mailing offices. **Reprints:** Copyright 1993 by CIO Publishing Inc. All rights reserved. Reproduction of material appearing in CIO is forbidden without written permission. Send all reprint requests to Permissions Editor, CIO, 492 Old Connecticut Path, PO Box 9208, Framingham, Massachusetts 01701-9208. **Photocopy Rights:** Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CIO for users through the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus \$.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, Massachusetts 01970. Please specify: ISSN 0894-9301. Permission to photocopy does not extend to contributed articles followed by this symbol: ‡. **Microfilm:** CIO issues and articles can be purchased on 16mm and 35mm microfilm and on 105mm microfiche through University Microfilms International, Serials Acquisitions Department, 300 N. Zeeb Road, Ann Arbor, Michigan 48106. **Subscriptions:** Address inquiries to CIO, 492 Old Connecticut Path, P.O. Box 9208, Framingham, Massachusetts 01701-9208. CIO is free to qualified information executives. To all others the one-year basic rate is \$94 for U.S. and Canada, \$175 to foreign countries (payable in U.S. funds only). The single copy price is \$7. Please allow 4 to 6 weeks for new subscriptions to begin. **Change of Address:** Please fax a copy of current subscription label along with new address to (508) 872-0618. Allow 4 to 6 weeks for change to take effect. **Postmaster:** Send change of address to CIO, P.O. Box 489, Northbrook, Illinois 60065-9816.

But really, how much impact can a phone system have on a company's profits?

How's 357% grab you?

Don't believe it? Just ask West
Capital Financial Services.

Their revenues are tied
directly to the efficiency of their
phone system. But with a merely
ordinary phone
system and
a tedious
set of manual
procedures,
processing accounts
was painfully slow-
going.

They knew there had to be a
better way. So they called ROLM.

And we did something
different. We asked questions.

We observed their business. And

we installed a system that lets
agents handle nearly four times as
many calls a day.

Revenues
instantly
shot
up from
\$1.4 million

annually to \$5
million.

Not too shabby
— for a phone
system.

You see, at

ROLM, we insist on learning

every last detail about your

business. Who calls whom at

what time? What happens if

Mr. X isn't in? How could Ms. Y
service customers faster?

It may be you need something
as sophisticated as a telephone-
to-computer link. Or as a simple
as a creative way to use voicemail.

In the end, you get a phone
system that works harder. And

a business
that works more efficiently. Give
us a call at **1-800-ROLM-123**.

We'll send you a free video

highlighting a number
of impressive ROLM
success stories.

Of course, you
will be even more
impressed when you

see what we'll do

for your business.



ROLM is part of the Siemens
family. The world's largest
private communication
systems manufacturer, serving
you in over 132 countries
around the world.
Talk about big families.

ROLM
A Siemens Company

Informix Database Technology Helps The Home Depot Assure That "Low Prices Are Just The Beginning."



When The Home Depot decided to make a long-term commitment to UNIX® and open systems, they turned to us, Informix, the experts in UNIX relational database management systems.

A Flexible, Economical Computing Environment.

Home Depot, America's largest home center retailer, wanted hardware independence, shorter development life cycles, and better system performance — all at reduced costs. Home Depot made a strategic decision to convert its "do-it-yourself" stores to UNIX-based platforms and applications.

The Home Depot chose Informix's database as part of their UNIX solution.

Reduced Deployment Times and Increased Productivity.

The Home Depot uses the INFORMIX-4GL Product Family to develop applications including inventory, labor management, and other customer service-driven applications. Home Depot expects the applications will be used by up to 4,000 system users. That number should grow in line with the company's projected new store opening rate of 25 percent per year.

The Home Depot and thousands of other companies have called on us for 12 years to successfully handle their critical data.

If you're considering UNIX for data management, talk to Informix. Because we're the experts.

Call 1-800-688-IFMX.



THE UNIX DATABASE EXPERTS.